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APRIL 15, 1977

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 10, NUMBER 8
APRIL 15, 1977

W77-03601 -- W77-04100

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

CONTENTS

FOREWORD iii

SUBJECT FIELDS AND GROUPS

Please use the edge index on the back cover to locate Subject Fields and Indexes.

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Nonwater Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

ANALYTIC EQUATION OF STATE FOR SEA WATER,
Scripps Institution of Oceanography, San Diego, Calif. Marine Physical Lab.
For primary bibliographic entry see Field 1B.
W77-03770

GEOTHERMAL INVESTIGATIONS IN IDAHO, PART 4, ISOTOPIC AND GEOCHEMICAL ANALSES OF WATER FROM THE BRUNEAU-GRAND VIEW AND WEISER AREAS, SOUTHWEST IDAHO,
Geological Survey, Reston, Va.; and Geological Survey, Boise, Idaho.
C. T. Rightmire, H. W. Young, and R. L. Whitehead.
Idaho Department of Water Resources, Boise, Water Information Bulletin No 30, July 1976. 28 p, 11 fig, 6 tab, 22 ref.

Descriptors: *Geothermal studies, *geochemistry, *Groundwater recharge, *Deuterium, *Oxygen isotopes, *Idaho, Hydrogeology, Precipitation(Atmospheric), Topography, Water levels, Hot springs, Water wells, Data collections.
Identifiers: Southwest Idaho, Bruneau-Grand View area(Idaho), Weiser area, Oxygen-18.

Variations of deuterium and oxygen-18 concentrations in thermal ground water and local nonthermal springs have been used to aid in describing the source of recharge in the Bruneau-Grand View and Weiser areas, southwest Idaho. Isotope and geochemical data for the Bruneau-Grand View area suggest that recharge to the area may not be entirely from sources within the local surface-drainage area, but possibly from the areas of higher altitude of the Bruneau River drainage to the southeast; or that the hot water that wells and springs are discharging is water that was recharged at a time when the regional climate was much colder than the present climate. Recharge to the Weiser area is probably from areas of higher altitude to the north and northeast of the local drainage area. However, 'local' precipitation does influence both the chemical and isotopic compositions of the waters in each area. (See also W76-02655 and W75-10147) (Woodard-USGS)
W77-03896

1B. Aqueous Solutions and Suspensions

ANALYTIC EQUATION OF STATE FOR SEA WATER,
Scripps Institution of Oceanography, San Diego, Calif. Marine Physical Lab.
F. H. Fisher, R. B. Williams, and O. E. Dial, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A019 504, Price code: A02 in paper copy, A01 in microfiche. SIO Reference 75-30, December 1, 1975. 14 p, 3 fig, 9 tab, 18 ref. ONR N00014- 69-A-0200-6002, NSF DES-70-00094A04.

Descriptors: *Volume, *Pressure, *Salinity, *Sea water, *Water properties, Physical properties, Chemical properties, Saline water, Water quality, Temperature, Sea water, Equations, Mathematics, Numerical analysis, Mathematical studies, Properties.
Identifiers: *Tumlirz equation, *Pure water, *Pure water properties, Sea water properties, Adiabatic gradient.

Earlier work by Fisher and Dial on pure water and sea water showed the effectiveness of the Tumlirz equation in representing the precision pure water data of Kell and Whalley from 0 to 150 C up to 1000 bars. In addition, it was also shown that a modified Tumlirz equation could be used to represent the sea water data of Wilson and Bradley. The equation is V = V sub infinity -K sub 1 times S + lambda/P sub 0 + K2S + P, where V is the specific volume, P the pressure, S the salinity, and V sub infinity, lambda, and P sub 0 are temperature dependent parameters for pure water. In this paper, the thermal expansion data of Bradshaw and Schleicher and the sound velocity data of Wilson have been incorporated to yield a new equation of state for sea water. Values of the adiabatic gradient calculated with this equation for S = 35 parts per thousand are slightly lower at 2 C than those reported by Fofonoff, for example, 4% at 400 bars and 7% at 1000 bars. (Henley-ISWS)
W77-03770

2. WATER CYCLE

2A. General

RUNOFF FILES FOR FLOOD HYDROGRAPH SIMULATION,
Hydrocomp, Inc., Atlanta, Ga. Atlanta Regional Office.
For primary bibliographic entry see Field 2E.
W77-03748

EXPERIMENTS WITH THE SURFACE HEAT AND WATER BUDGETS OF THE CANADIAN MIDDLE NORTH,
McGill Univ., Montreal (Quebec). Dept. of Meteorology.
For primary bibliographic entry see Field 2D.
W77-03749

A COMPARISON OF MODELING AND STATISTICAL EVALUATION OF HYDROLOGIC CHANGE,
Melbourne and Metropolitan Board of Works (Australia).
For primary bibliographic entry see Field 4D.
W77-03800

HYDROLOGIC ASPECTS OF SPACE INVESTIGATIONS OF THE EARTH'S SURFACE (LITERATURE SURVEY),
For primary bibliographic entry see Field 7B.
W77-03848

PRELIMINARY DIGITAL MODEL OF GROUND-WATER FLOW IN THE MADISON GROUP, POWEDER RIVER BASIN AND ADJACENT AREAS, WYOMING, MONTANA, SOUTH DAKOTA, NORTH DAKOTA, AND NEBRASKA,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03882

UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM HYDROLOGIC EVENTS: A BAYESIAN APPROACH,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering; and Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. R. Davis, L. Duckstein, and M. M. Fogel.
Journal of Hydrology, Vol 31, No 1/2, p 81-95, September 1976. 4 fig, 2 tab, 28 ref. OWRT B-032-ARIZ(18). NSF GK-35791.

Descriptors: *Storms, *Floods, *Risks, *Frequency, *Model studies, Thunderstorms, Distribution, Rainfall-runoff relationships, Water resources, Seasonal.
Identifiers: *Bayesian approach, Event-based rainfall model, Distribution parameters.

The effect of uncertainty in parameter of rainfall inputs on the return period of maximum rainfall amounts and runoff volumes in a thunderstorm season was ascertained. The return period of the maximum seasonal rainfall amount was considered using an event-based rainfall model which incorporates the distribution of the number of events per season and the distribution of point rainfall per event. The runoff and peak flow were calculated from the event-based rainfall model coupled with a linear rainfall-runoff relationship. A distribution function for peak flows was developed considering the uncertainties in the distribution parameters of the two distributions in the event-based rainfall model. It was found that the expected values of return periods vary substantially even for a record length of twenty years. The Bayesian approach for a decision-theoretic analysis of a water resource design problem was shown to be advantageous inasmuch as the effects of uncertainties on the design are evaluated. (Singh-ISWS)
W77-03972

CONTROL OF FJORDIC DEEP WATER RENEWAL BY RUNOFF MODIFICATION,
Dunstaffnage Marine Research Lab., Oban (Scotland).
For primary bibliographic entry see Field 2L.
W77-03975

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
For primary bibliographic entry see Field 2L.
W77-04008

2B. Precipitation

ON A DERIVABLE FORMULA FOR LONG-WAVE RADIATION FROM CLEAR SKIES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
W. Brutsaert.
Water Resources Research Vol 11, No 5, p 742-744, October 1975. 1 fig, 1 tab, 16 ref.

Descriptors: *Radiation, Mathematical studies, Mathematics, Model studies, Atmosphere, Climatology.
Identifiers: *Long-wave radiation, *Formula derivation, Emissivity.

A derivation is presented for the effective atmospheric emissivity to predict downcoming long-wave radiation at ground level under a clear sky and for a nearly standard atmosphere. The results are in good agreement with those obtainable with empirical formula based on water vapor pressure and temperature. However, the proposed formulation has the advantage that its simple functional form is based on physical grounds without the need for empirical parameters from radiation measurements. Also, in contrast to the empirical equations, it may be adjusted in a simple way to reflect changes in climatic and atmospheric conditions. (Skogerboe-Colo St)
W77-03638

WATER RESOURCES DATA SYSTEM,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W77-03728

DESERTIFICATION: SYMPTOM OF A CRISIS,
International Center for Arid and Semi-Arid Land Studies, Lubbock, Tex.
For primary bibliographic entry see Field 4C.

W77-03737

THE CONSEQUENCES OF FOOLING MOTHER NATURE,
Arizona Univ. Tucson. Dept. of Geosciences.
T. L. Smiley.
In: Desertification: Process, Problems, Perspectives, Arid-Semi-Arid Natural Resources Program seminar papers, University of Arizona, p 25-31, Sept. 1976.

Descriptors: *Arid lands, *Semiarid climates, *Climatology, Impact(Rainfall), Precipitation(Atmospheric), Solar radiation, Air circulation, Irrigation effects.
Identifiers: *Desertification, Deforestation, Overgrazing.

The climatic characteristics of arid lands and the human contribution to desertification are described. Arid or semiarid regions have in common only the scarcity of precipitation and available water. Of the earth's land surface, 20% is considered arid and 15% semiarid. The arid and semiarid conditions are relative in terms of total precipitation and rate of precipitation. A partial account of arid land formation is presented in terms of global effects from solar radiation and consequent atmospheric changes and air movements. Deforestation, livestock overgrazing, cereal cultivation, the pumping of water from underground sources, and irrigation of dry land are all considered contributors to desertification. (Jahns-Arizona)
W77-03738

ATMOSPHERIC DUST AND SURFACE ALBEDO: EFFECTS ON DESERTIFICATION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2D.
W77-03739

THE TWO-AXIS METHOD: A NEW METHOD TO CALCULATE AVERAGE PRECIPITATION OVER A BASIN,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
N. Bethlahmy.
Hydrological Sciences Bulletin, Vol. 21, No. 3, p 379-385, September 1976. 3 fig, 1 tab, 11 ref.

Descriptors: *Mathematical studies, *Precipitation(Atmospheric), *Basins, Orography, Rain gages, Isohyets, Watersheds(Basins), Average, Mathematics.
Identifiers: *Two-axis method, Thiessen method, Areal average precipitation, Weighting, Station angle.

The two-axis method, used to calculate average precipitation over a basin, was based on three assumptions inherent in the Thiessen and isohyetal methods. The method followed four steps: (1) the two axes of a basin are drawn following a standard procedure; (2) for each raingage location, a station angle is determined by either measuring or calculating the angle between lines connecting the station location to the farthest ends of the two axes; (3) each station is assigned a weight (the ratio of its angle to the sum of all station angles); (4) average area precipitation is calculated as the sum of the products of corresponding station weights and measured precipitation. The method is fast, efficient, and readily computerized. (Jones-ISWS)
W77-03755

A PRELIMINARY STUDY OF THE MAGNITUDE, FREQUENCY AND DISTRIBUTION OF INTENSE RAINFALL IN NIGERIA,
Ibadan Univ. (Nigeria). Dept. of Geography.
J. O. Ayoade.
Hydrological Sciences Bulletin, Vol. 21, No. 3, p 419-429, September 1976. 6 fig, 3 tab, 18 ref.

Descriptors: *Precipitation(Atmospheric), *Probable maximum precipitation, *Statistical methods, *Rainfall, *Cloudbursts, Frequency, Distribution, Foreign countries, Distribution patterns, Mapping, Mathematical studies.
Identifiers: *Nigeria, Daily rainfall, Chow method, Gumbel method.

Estimates were made of magnitude/frequency relationships for daily rainfall amounts recorded at representative Nigerian stations. Probable maximum precipitation estimates also were made base on the Chow general frequency formula. It was found that the daily probable maximum precipitation varied from 9.5 inches to 23.79 inches. (Jones-ISWS)
W77-03756

AUGMENTATION OF 1968-1972 WINTER STORMS IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3B.
W77-03838

WATERFOWL AND ACID PRECIPITATION IN NORWAY, (IN DANISH),
Zoologisk Museum, Oslo (Norway).
For primary bibliographic entry see Field 5C.
W77-03841

TIME OF PONDING--COMPARISON OF RESULTS OF THE PARLANGE SOLUTION WITH THE SMITH AND MEIN-LARSON MODELS,
Indian Inst. of Tech. Bombay. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W77-03855

RECENT MEASUREMENTS OF WIND STRESS ON ARCTIC SEA ICE,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 2C.
W77-03980

STORM SURGES IN THE SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
For primary bibliographic entry see Field 2L.
W77-03986

INTENSITY OF RAINFALL IN CLERMONE-FERRAND, (IN FRENCH),
J. Tixeront.
Rev Sci Nat Auvergne 39 (1-4), p 13-30, 1973.

Descriptors: *Rainfall intensity, Seasonal, *Agriculture, Precipitation(Atmospheric), *Soil erosion, Europe.
Identifiers: *France(Clermont-Ferrand).

The intensity, duration, accumulated precipitation and seasonal variations of rainfall from 1958-1973 are reported. Applications of such information are discussed, including problems in agriculture related to soil erosion from rainfall.--Copyright 1976, Biological Abstracts, Inc.
W77-04032

2C. Snow, Ice, and Frost

THEORETICAL MODEL OF RIVER ICE JAMS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
M. S. Uzuner, and J. F. Kennedy.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY9, Proceedings Paper 12412, p 1365-1383, September 1976. 10 fig, 12 ref, 1 append. Army DAC25-73-C-0032, NSF GK-3590X1.

Descriptors: *Ice jams, *Ice, *Model studies, Mathematical models, Rivers, Ice loads, Freezing, Flow, Unsteady flow, Open channel flow, Channel flow, Non-uniform flow, Floods, Bridges, Ice cover.

A mathematical analysis was developed to describe the evolution and characteristics of river ice jams. The principal components of the analytical model were the static force equilibrium of the fragmented ice cover; the unsteady continuity equations for the frozen and liquid water; the nonuniform, unsteady momentum relation for the flow; and relations in which compressive and shear strengths of the floating fragmented ice cover vary linearly with local jam thickness. A numerical method was outlined for solving the equations for the case in which the jam has evolved to the point that it propagates upstream with constant velocity (quasi-steady conditions), and a complete set of example results was presented for a specific flow and channel. Estimates were derived for the time required for the jam to evolve to the quasi-steady state and for the velocity of the jam front during the evolutionary stage. (Sims-ISWS)
W77-03745

ESTIMATE OF THE SUITABILITY OF TELEVISION INFORMATION FROM METEOROLOGICAL METEOR SATELLITES FOR DETERMINING ICE CONDITIONS IN LAKES AND RESERVOIRS,
V. G. Prokacheva.
Soviet Hydrology, Selected Papers, No 1, p 28-32, 1975. 3 fig, 3 tab, 6 ref. Translated from Trudy Gossudarstvennogo Gidrologicheskogo Instituta, No 205, p 115-123, 1975.

Descriptors: *Remote sensing, *Ice cover, *Lakes, *Reservoirs, Satellites(Artificial), Ice, Photography, Winter, Cold regions, Freezing, Thawing.
Identifiers: *Meteor satellite.

The operative meteor satellite system regularly transmits television pictures to earth that show cloud distribution and the state of the underlying surface in cloud-free regions of the world. Ice formations that appear on the water surface change its natural albedo and are necessarily reproduced on TV pictures. The contribution of ice formations to the TV image depends on the amount and type of ice. The images of the same lake, obtained in different phases of its ice regime, differ correspondingly. The estimated terrain resolution of the TV picture is 1.25-3 km. Consequently, lakes with an area greater than 4-9 sq km are reproduced on the photographs (by at least several signals), and their ice conditions can thus be estimated. The TV information from meteor satellites is suitable for determining ice conditions in large, medium, and small lakes and reservoirs. Under favorable conditions, it is possible to estimate ice conditions for lakes and reservoirs exceeding 10 sq km in area. The volume of useful information on ice conditions in a lake, extractable from TV pictures, is determined not only by the size of the body of water, but also by its shape. The more the shape of a lake or reservoir departs from a square, the less detailed (under otherwise equal conditions) the information on ice conditions in the lake or reservoir. (Sims-ISWS)
W77-03765

SEASONAL VARIATIONS OF CHEMICAL CONSTITUENTS IN ANNUAL LAYERS OF GREENLAND DEEP ICE DEPOSITS,
State Univ. of New York at Buffalo. Dept. of Earth Sciences.
C. C. Langway, Jr, J. H. Cragin, G. A. Klouda, and M. M. Herron.

Available from the National Technical Information Service, Springfield, VA 22161 as ADA-021 319, Price codes: A02 in paper copy, A01 in microfiche. CRREL Research Report 347, December 1975. 8 p, 2 fig, 14 ref. NSF OPP 750-6750.

Descriptors: *Ice, *Core logging, *Dating, Chemical, Chemical analysis, Seasonal, Annual, Cold region, Foreign countries, Ice cover, Glaciology.
Identifiers: *Greenland, Ice cores, Seasonal variations, Chemical variations.

Chemical analysis of century-old ice from continuous 5 to 7 year intervals of three ice cores from south and central Greenland (Dye 3, Milcent, and Crete) showed maximum concentrations of Na, Mg, Ca, K, and Al during early spring and minimum concentrations during late summer and early fall. Peak spring values are as much as 10 times greater than fall values. Because of the large seasonal chemical variations, samples used for depth-age or annual deposition rate studies must represent accumulation from exactly one year or whole multiples of a year. The seasonal chemical variations seem promising as a new method of defining annual layers and thus dating old ice cores. (Sims-ISWS)
W77-03773

USE OF SATELLITE SURVEY MATERIAL IN GLACIOLOGICAL INVESTIGATIONS,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
I. S. Garelik, A. M. Grinbert, and A. N. Krenke.
Soviet Hydrology, Selected Papers, No. 1, p 45-49, 1975. 3 fig, 2 tab, 18 ref. Translated from News of the USSR Academy of Sciences, Geographic Series (Izvestiya Akad. nauk SSSR. Ser. geograf.), No. 1, p 93-101, 1975.

Descriptors: *Remote sensing, *Snow surveys, *Glaciers, Satellites(Artificial), Snow, Precipitation(Atmospheric), Runoff, Photography, Photogrammetry, Analytical techniques, Surveys, Snowmelt, Water resources, Mountains, Mapping, Data processing.
Identifiers: *USSR.

The images of ice and snow on photographs taken from the manned orbital station Salyut 1 by the cosmonauts G.T. Dobrovol'skiy, V.N. Volkov, and V.I. Papayev were analyzed. Medial moraines and the ice and snow surfaces on glaciers are recognizable on the photographs. On the Southern Inyl'chek Glacier, one can see that its southern, left side has more moraine inclusions. The photographs also show the medial moraines that divide ice streams flowing from individual tributary glaciers. The temporary snow line can be identified reliably on the rocky surface. The accuracy of the stereophotogrammetric determination of elevations was estimated from the differences of double measurements at 30 points. The root-mean-square error proved to be plus or minus 120 m. This includes photograph errors, survey camera errors, instrumental errors, and errors associated with the form of the photogrammetric intersection, which depends on the altitude and base of the survey. The study testified to the great possibilities offered by space photographs to glaciological research. It must be emphasized that these possibilities include not only qualitative identification of glaciological formations on space photographs, but also the possibility of obtaining quantitative information necessary for hydrologic computations. (Sims-ISWS)
W77-03851

SOIL MOISTURE MOVEMENT BY TEMPERATURE GRADIENT,
Auckland Univ. (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W77-03861

OPERATIONAL APPLICATIONS OF SATELLITE SNOWCOVER OBSERVATIONS AND LANDSAT DATA COLLECTION SYSTEMS OPERATIONS IN CENTRAL ARIZONA,
Geological Survey, Tucson, Ariz. Water Resources Div.
H. H. Schumann.
Reprint from Proceedings of NASA Workshop on Operational Applications of Satellite Snowcover Observations, held at South Lake Tahoe, California, August 18-20, 1975: National Aeronautics and Space Administration Rept NASA SP-391, p 13-28, 1975. 8 fig, 1 tab, 4 ref.

Descriptors: *Snow cover, *Snowmelt, *Remote sensing, *Satellites(Artificial), *Telemetry, Snow surveys, Hydrologic data, Aerial photography, Reservoir operation, Arizona, Flood control, Watershed management.
Identifiers: *Salt-Verde watershed(Ariz).

Repetitive Landsat and NOAA-4 satellite imagery together with aerial surveys are being evaluated to develop an operational capability for mapping snowcover distributions on the Salt-Verde watershed of central Arizona. Satellite telemetry is being used also for near-real time relay of hydrologic data to aid in the management and operation of reservoirs on the Salt and Verde Rivers. For use in rating satellite imagery, the depth and distribution of snowcover was measured by examination of oblique aerial photographs of snow markers. This method allowed rapid and economical determination of snow depths. The Landsat Data-Collection System (DCS) relays hydrologic data from remote and relatively inaccessible earth-based sensors. The Landsat telemetry system relays information from streamflow- and snow-monitoring installations located in the upper parts of the Salt-Verde Watershed. (Woodard-USGS)
W77-03971

A CANADIAN ARCTIC FJORD WITH SOME COMPARISONS TO FJORDS OF THE WESTERN AMERICAS,
Department of the Environment, Victoria (British Columbia). Frozen Sea Research Group, and Department of the Environment, Victoria (British Columbia). Ocean and Aquatic Affairs.
For primary bibliographic entry see Field 2L.
W77-03977

RECENT MEASUREMENTS OF WIND STRESS ON ARCTIC SEA ICE,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
E. G. Banke, S. D. Smith, and R. J. Anderson.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2307-2317, October 1976. 10 fig, 5 tab, 16 ref.

Descriptors: *Sea ice, *Winds, *Wind pressure, *Arctic, Drag, Stress, Summer, Winter, Heat transfer, Seasonal, On-site investigations, Roughness coefficient, Model studies, Mathematical models, Laboratory tests, Ice.
Identifiers: *Wind stress, Wind drag.

Eddy flux measurements of wind stress on the Arctic Pack ice were made in summer and winter in terrain ranging from flat to hummocked. Parameterization by a drag coefficient dependent on a surface parameter was suggested. Reduced values of the drag coefficient were observed in highly stable stratification. The coefficient for sensible heat flux is lower than the drag coefficient. Wind drag on ice ridges has been measured by a pressure differential method. (Sims-ISWS)
W77-03980

ROLE OF THE SNOW COVER IN THE NATURE OF NORTHERN LANDSCAPES AND ITS PHYSICAL PROPERTIES,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
V. G. Khodakov.
Soviet Hydrology, Selected Papers, No. 2, p 60-65, November 1975. 4 fig, 8 ref. Translated from Izvestiya Akademii Nauk SSSR, Seria Geograficheskaia, No. 1, p 17-26, 1975.

Descriptors: *Snow cover, *Mountains, *Tundra, Forests, Glaciers, Foreign countries, Snow, Foreign research, Physical properties, Albedo, Density, Water resources, Snowmelt, Cold regions, On-site investigations.
Identifiers: *USSR, *Polar Ural Mountains(USSR).

A brief description was given of the main results of investigations by the Polar Ural expedition of the Institute of Geography of the USSR Academy of Sciences of snow cover properties in various landscape zones. These investigations covered the glacial-alpine tundra belt of the Ural Mountains, and the tundra, forest-tundra, and taiga zones of the Cis- and Trans-Ural. The snow cover properties were investigated (specific mass, density, thermal conductivity, surface albedo, transparency to solar radiation, ultimate bending and tensile strength, viscosity coefficient, compaction under load, and trafficability of virgin land for caterpillar tractors), as well as their main spatial distribution patterns. It was concluded that further development of combined landscape-geophysical and special engineering snow surveys is needed. (Sims-ISWS)
W77-03988

GLACIAL LAKE SEDIMENTATION, AUSTERDALSISEN, NORWAY,
Manchester Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 2J.
W77-04005

2D. Evaporation and Transpiration

ESTIMATED WATER BALANCE FOR THE PROPOSED HADITHA RESERVOIR ON THE EUPHRATES RIVER IN IRAQ,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 4A.
W77-03625

EFFECT OF DEW ON LEAF WATER POTENTIALS AND CROP RESISTANCES IN A PASPALUM PASTURE,
Department of Scientific and Industrial Research, Palmerston North (New Zealand).
For primary bibliographic entry see Field 3F.
W77-03736

ATMOSPHERIC DUST AND SURFACE ALBEDO: EFFECTS ON DESERTIFICATION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
S. B. Idso.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-arid Natural Resources Program seminar papers, University of Arizona, p 32-39, March 1976. 20 ref.

Descriptors: *Dusts, *Albedo, *Arid lands, *Precipitation(Atmospheric), Radiation, Temperature, Erosion, Soil moisture.
Identifiers: *Desertification, *Atmospheric dust, *Surface albedo.

Existing literature concerning desertification is reviewed, theories of the process are discussed, and a model based on the effects of atmospheric dust and surface albedo is advanced. The author has investigated dust effects on long-wave thermal radiation from the atmosphere and linked dust-trapping inversions with increased surface temperatures. It is proposed that surface denudation and increased soil particles in the atmosphere may

cause overseeding of clouds and suppress rainfall. Soil moisture effects on albedo are described, along with the impact of atmospheric dust in the region of the solar spectrum. Studies indicate that as the albedo of the underlying surface increases, the ratio of absorption to backscattering coefficients of particles required for heating decreases. For the high albedos of many desert surfaces, the crucial ratio required for heating decreases to a value where heating will most likely occur at the surface if the dust content of the atmosphere increases. As this occurs, surface heating will be compensated by upper atmospheric cooling and resultant subsidence increases, reducing rainfall. (Jahns-Arizona).
W77-03739

EXPERIMENTS WITH THE SURFACE HEAT AND WATER BUDGETS OF THE CANADIAN MIDDLE NORTH,
McGill Univ., Montreal (Quebec). Dept. of Meteorology.
E. Vowinckel, and S. Orvig.
Tellus, Vol. 28, No. 5, p 442-450, 1976. 9 tab, 5 ref, 1 append.

Descriptors: *Hydrologic budget, *Canada, *Heat budget, *Surface runoff, Water balance, Hydrologic aspects, Hydrologic properties, Surface waters, Evaporation, Runoff, Hydrology, Surfaces, Vegetation effects, Rocks, Lichens, Hydrologic data.

The effects of surface changes on the heat and water budgets of the Canadian Middle North were studied for the region of The Pas, Manitoba, using a surface energy balance model and daily synoptic and radiosaonde observations for the period July 1967-June 1968. Comparisons were made with the results of a previous, similar investigation for the same period for the Boreal region of Moosonee, Ontario. The Boreal region showed a positive water budget for all surface types, i.e., runoff, while The Pas showed a substantial water deficit for all surface types except that of rock. This deficit was calculated when using similar surface type descriptions to those of Moosonee (bare ground, forest, lake, and rock). As the river runoff measurements indicate a moderate annual regional water surplus, it was concluded that there may be conditions at The Pas which reduce evaporation and which are not generally typical for other areas previously examined. Such possibilities were investigated. The main point of interest proved to be the characteristics of vegetation types like lichen, which has marked water retention properties because it generates strong resistance to evaporation. In order to obtain a realistic water budget for the region, it thus becomes essential to ascertain in considerable detail the structure of the vegetation cover and to calculate the evaporation from each of the various surface types. The composite regional water budget for 1967-1968 proved to be approximately balanced. Open water showed high evaporation loss, and lakes can only exist in the region by receiving water from surfaces of rock, lichen, moss, or thin soil. Maintaining an increased water area, as behind reservoir dams, would require either reduction in forest covered land or the import of water from outside the region. Large-scale destruction of moss and lichen would apparently have far reaching consequences for the regional water budget. (Humphreys-ISWS)
W77-03749

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-I. COMPUTER MODEL AND ITS EVALUATION USING WIND-TUNNEL EXPERIMENTS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
P. W. Westerman, B. J. Barfield, O. J. Loewer, and J. N. Walker.
Transactions of the American Society of Agricultural Engineers, Vol. 19, No. 5, p 881-888, September-October 1976. 3 fig, 6 tab, 16 ref, 3 append.

Descriptors: *Computer models, *Spraying, *Simulation analysis, *Model studies, *Leaves, *Evaporation, *Transpiration, Environment, Surface waters, Radiation, Energy, Wetting.
Identifiers: *Sprinkling systems, *Evaporative cooling, Transpiring leaf, Environmental conditions, Surface water characteristics, Short-wave radiation, Leaf thermal radiation, Leaf convection, DYNAMO simulation language.

A simulation computer model was developed using DYNAMO simulation language to predict the evaporative cooling of a transpiring leaf when water is present on the surface of the leaf. To verify the model, experimental tests were conducted with cucumber leaves in a wind tunnel using photoflood lamps as radiation sources and using drops approximating half spheres for surface wetting. Measured leaf temperature reductions during 10 minutes after surface wetting 20, 15, and 7% of the leaf's top side were 4.8, 4.4, and 4.0C, while the corresponding simulated temperature reductions were 3.0, 4.5, and 3.4C. Free stream velocity was 100 cm/s. (See also W77-03758) (Roberts-ISWS)
W77-03757

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-II. SIMULATED EFFECT OF VARIATIONS IN ENVIRONMENTAL CONDITIONS, LEAF PROPERTIES, AND SURFACE WATER CHARACTERISTICS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
P. W. Westerman, B. J. Barfield, O. J. Loewer, and J. N. Walker.
Transactions of the American Society of Agricultural Engineers, Vol. 19, No. 5, p 889-896, September-October 1976. 1 fig, 7 tab, 9 ref, 1 append.

Descriptors: *Evaporation, *Leaves, *Computer models, *Transpiration, Environment, Energy, Temperature, Radiation, Surface waters, Model studies.
Identifiers: *Transpiring leaf, *Energy fluxes, Leaf convection, Evaporative cooling, Surface water characteristics, Short-wave radiation, Leaf thermal radiation, DYNAMO simulation language.

The DYNAMO simulation language was used in a simulation computer model to predict the evaporative cooling of a transpiring leaf when water is present on its surface. Simulation was also used to determine the effect on leaf temperature of changing various model parameters. Parameters tested in the sensitivity analysis included initial conditions, environmental conditions, leaf properties, resistances to heat and mass transfer, and the amount and geometry of the water present. Results indicated that the cooling effect would normally be between 1 and 5C for up to 60% wetted area 10 minutes after applying surface water directly to a leaf. Air temperature and humidity had as much, or more, effect on leaf temperature as any of the other variables for the conditions tested. (See also W77-03757) (Roberts-ISWS)
W77-03758

SPACE-TIME CORRELATION FUNCTION OF THE FIELD OF EVAPORATION FROM THE WATER SURFACE,
Yu. A. Manktin.
Soviet Hydrology, Selected Papers, No 1, p 37-39, 1975. 3 fig, 3 tab, 7 ref. Translated from Trudy Gossudarstvennogo Gidrologicheskogo Instituta, No 205, p 73-79, 1975.

Descriptors: *Evaporation, *Spatial distribution, *Seasonal, Correlation analysis, Rivers, Lakes, Water loss, Air-water interfaces, Mathematical studies, Regression analysis, Variability, Homogeneity, Monthly.
Identifiers: *USSR.

An objective analysis of the field of evaporation from the water surface in the Soviet Union was performed in 1972 for the first time at the Valday Hydrologic Scientific Research Laboratory. The correlation functions of the field of monthly evaporation totals from GGI-3000 evaporimeters were computed; the errors of the initial data and of the optimum interpolation were estimated; and the optimum distances between observation points were evaluated. However, problems associated with the seasonal pattern of the monthly correlation coefficients remained unresolved. These problems were discussed in this report. Ninety values of pair correlation coefficients, covering distances from 0 to 3700 km between the network stations, were computed for 35 evaporation stations with a degree of shielding of type I for the lowland territory. The evaporation field is homogeneous and isotropic with respect to the correlation function for each month. To identify the seasonal pattern, space-time profiles of the monthly functions were constructed. There was no distinct seasonal pattern of the correlation function, except in October for which the values of these functions are lower than for the other months. These differences are apparently produced by an increase in the random errors of the initial data, the short records of concurrent observations used in sampling for this month, their unequal duration for different pairs of stations, and the small number of computed values of pair correlation coefficients. To distances of 500 km between stations, the total errors of optimum interpolation are lower by a factor of 2 or more than the natural climatic variation of evaporation for the water surface. (Sims-ISWS)
W77-03849

LAKE ERIE TERRESTRIAL RADIATION,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2H.
W77-03858

EVAPORATION AND ADVECTION I: EVAPORATION FROM EXTENSIVE HOMOGENEOUS SURFACES,
Department of Scientific and Industrial Research, Lincoln (New Zealand). Crop Research Div.
K. G. McNaughton.
Quarterly Journal of the Royal Meteorological Society, Vol. 102, No. 431, p 181-191, January 1976. 21 ref.

Descriptors: *Evaporation, *Model studies, *Advection, *Homogeneity, Latent heat, Heat transfer, Heat resistance, Vapor pressure, Equations.
Identifiers: *Bowen ratio, Sensible heat, Moisture transfer, Heat flux, Net radiation, Psychrometric constant.

The process of modification of the Bowen ratio, with distance downwind of a change in surface wetness, is believed to establish the ratio of the fluxes of sensible and latent heat when unaffected by surface inhomogeneity. The case of steady-state, two-dimensional advection was considered. It was shown that the coupled, simultaneous, diffusion equations for heat and moisture transfer from natural vegetated or wet surfaces can be used to generate two indendent diffusion equations in composite variables. The height integral of the reciprocal effective eddy diffusivity is assumed to become indefinitely large with height, so that heat and moisture continuously accumulate within the overpassing air. However, the surface latent heat flux approaches a quasi-equilibrium value given, in conventional symbols, by $LE = (s/(s + y))(Rn - G)$. For terrestrial surfaces, where the available energy depends only slightly on surface temperature, the Bowen ratio approaches y/s. For deep water bodies and melting snow, the heat flux into the surface also evolves with distance, and the above relationship is approached only in the trivial

sense that Rn = G and LE = 0. This model for terrestrial surfaces was consistent with some recent experimental observations. (Jones-ISWS)
W77-03859

2E. Streamflow and Runoff

TRANSVERSE DISPERSION IN MEANDERING CHANNELS,
Canada Centre for Inland Waters, Burlington (Ontario).
B. G. Krishnappan, and Y. L. Lau.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-17-I-23, 4 fig, 7 ref.

Descriptors: *Rivers, *River flow, *Meanders, Mathematical studies, Numerical analysis, *Dispersion, Sedimentation, Sediment transport.

By the use of dimensional analysis, an investigation of the effects of meander characteristics on transverse dispersion was designed. The meandering flow was allowed to carve out its own bed which was then solidified and dispersion tests were conducted. Results indicated that there is a very large variation in flow depth across the channel and the distributions of tracer flux and transverse velocity are quite different from those experiments in which flat bed are used. A numerical method was developed to solve the diffusion equation and to check different assumptions for the dispersion coefficient. (See also W77-03642) (Chilton-ORNL)
W77-03644

THE APPLICATION OF HYMO TO STUDY AREAS OF SOUTHWESTERN WYOMING FOR SURFACE RUNOFF AND SOIL LOSS ESTIMATES,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 4A.
W77-03729

FLOW AT GRADE-BREAK FROM MILD TO STEEP SLOPES,
Los Angeles Dept. of Water and Power, Calif.
For primary bibliographic entry see Field 8B.
W77-03746

RUNOFF FILES FOR FLOOD HYDROGRAPH SIMULATION,
Hydrocomp, Inc., Atlanta, Ga. Atlanta Regional Office.
A. M. Lumb, and L. D. James.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY10, Proceedings Paper 12499, p 1515-1531, October 1976. 2 fig, 3 tab, 28 ref.

Descriptors: *Hydrograph analysis, *Georgia, *Model studies, Channel improvement, Detention reservoirs, Flood peak, Hydrologic budget, Floods, Flood stages, Land use, Rainfall, Routing, Runoff, Synthetic hydrology, Watersheds(Basins).
Identifiers: *Runoff files, Simulation analysis, Public funds, Land use planning, Stanford watershed model, Routing model, Storage routing.

A system based on continuous streamflow simulation was developed for use in DeKalb County, Georgia, to obtain information on flood frequency and flood hydrographs needed for land-use planning and drainage system design. The Stanford Watershed Model was used to generate storm period runoff volumes at small time steps for three soil types and impervious areas. Runoff volumes, which include the effects of antecedent rainfall and evapotranspiration, were stored on computer files and used as inputs to a routing model. Required inputs for the routing model included: (1) soil types and impervious areas for selection of runoff files; and (2) measurements of the drainage basin for channel and storage routing. (Roberts-ISWS)
W77-03748

LARGESCALE RIPPLES OF THE LOWER WABASH RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W77-03761

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03831

HYBRID COMPUTER MODEL OF ST. VENANT EQUATIONS,
Department of Agriculture, Lethbridge (Alberta). Research Station.
M. Oosterveld, and K. Adamowski.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY10, Proceedings Paper 12467, p 1491-1501, October 1976. 6 fig, 12 ref, 2 append.

Descriptors: *Computer models, *Unsteady flow, *Hybrid computers, *Forecasting, Hydrodynamics, Hydrology, Methodology, Analytical techniques, Computer programs, Routing, Equations.
Identifiers: *St. Venant equations, Method of lines approximations, Characteristic normal equations.

Hybrid computers are an important tool in scientific and engineering problem solving, yet they have received little attention to date. The St. Venant equations were solved on a hybrid computer to demonstrate features of the system. The partial differential equations were reduced to ordinary ones by a continuous-space method of lines. An analog circuit was designed to solve the ordinary differential equations, with the digital performing initializing and storing duties. The computer model was calibrated and tested on data from a laboratory channel. Simulation experiments were run to test the performance of the model under steady and unsteady flow. It was concluded that the hybrid model has potential for reducing flow forecasting costs and computing time. (Singh-ISWS)
W77-03832

SOME PROBLEMS IN THE STUDY OF THE INUNDATION OF RIVER FLOOD PLAINS BY AEROSPACE METHODS,
For primary bibliographic entry see Field 4A.
W77-03847

MODEL OF THE FORMATION OF RAIN FLOODS IN THE RIONI RIVER BASIN AND ITS USE FOR SHORT-RANGE FORECASTS,
V. A. Bel'chikov.
Soviet Hydrology, Selected Papers, No. 1, p 40-44, 1975. 3 fig, 2 tab, 8 ref. Translated from Trudy Gidrometsentra SSSR, No. 131, p 49-59, 1975.

Descriptors: Model studies, *Floods, *Rainfall, *Mathematical models, *Rivers, *Runoff, *Forecasting, Flood forecasting, Watersheds(Basins), Hydrograph analysis, Hydrographs, Drainage, Evaporation, Precipitation(Atmospheric), Seepage, Infiltration, Rainfall-runoff relationships.
Identifiers: *USSR, *Rioni River basin(USSR).

V.I. Koren' and L.S. Kuchment have recently developed a technique for constructing mathematical models of runoff formation and have proposed a model of the formation of rain floods for small drainage basins. This proposed model takes into account the main characteristics of runoff formation and permits determining with sufficient reliability the parameters of specific drainage basins needed for computation. Reported herein were the results of the use of the model of Koren' and Kuchment for the formation of rain floods in the development of an operative system of short-range forecasting rain floods in the Rioni River basin upstream of Sakochakidze village. The model in question is fairly general and can be applied to various physiographic conditions. However, because of the great diversity of runoff formation conditions in different physiographic zones, processes that are significant for one drainage basin frequently may not be significant for another. Therefore, it is desirable to simplify the model and, in some cases, to modify the description of individual elementary processes for different physiographic zones. Large forecasting errors were observed, as a rule, when the spatial variability of the development of the flood formation process was great. Therefore, dividing a drainage basin into parts with uniform precipitation distribution, as investigated first, may prove to be more rational if information over shorter time intervals is available. (Sims-ISWS)
W77-03850

EQUALIZATION OF FLOW VARIATIONS IN COMBINED SEWERS,
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Water Supply and Sewerage Engineering.
For primary bibliographic entry see Field 5D.
W77-03860

MAGNITUDE AND FREQUENCY OF FLOODS IN NEBRASKA,
Geological Survey, Lincoln, Nebr. Water Resources Div.
E. W. Beckman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 842/As, Price codes: A07 in paper copy, A01 in microfiche. Water-Resources Investigations 76-109, October 1976. 128 p, 26 fig, 5 tab, 25 ref.

Descriptors: *Flood forecasting, *Flood frequency, *Flood peak, *Nebraska, Regression analysis, Equations, Graphical analysis, Regional flood, Natural streams, Flow control, Flow characteristics, River basins, Drainage area, Flood control, Rainfall-runoff relationships, Gaging stations.

Estimates of flood characteristics with recurrence intervals up to 100 years can be obtained at most sites in Nebraska by use of techniques presented. For natural-flow streams, equations and graphical solutions are based on regional relations between floods of a specific return period and selected basin characteristics. Nebraska was subdivided into five hydrologic regions by means of regressions and residuals from the regressions. Flood magnitude and frequency solution diagrams are presented for major controlled streams including the North Platte, South Platte, Platte, and Republican Rivers. Observed maximum flood peaks at 303 gaging stations with 13 or more years of record and significant peaks at 57 short-term stations and 31 miscellaneous sites are useful in designing flood-control works for maximum safety from flood damage. Comparison is made with maximum observed floods in the United States. (Woodard-USGS)
W77-03886

RESERVOIR-SYSTEM MODEL FOR THE WILLAMETTE RIVER BASIN, OREGON,
Geological Survey, Jackson, Miss. Water Resources Div.
J. O. Shearman.

Available from Branch of Distribution, USGS, 1200 S. Eads St. Arlington, Va 22202. Circular 715-H, 1976. 22 p, 13 fig, 10 tab, 10 ref.

Descriptors: *Mathematical models, *Reservoirs, *Streamflow, *Watershed management, *Oregon, River basins, Flow characteristics, Reservoir operation, Flow control, Natural flow, Model studies, Systems analysis, Simulation analysis.
Identifiers: *Willamette River basin(Oreg), *Reservoir-system models.

Evaluation of basin-development alternatives in terms of potential impacts on river quality for the Willamette River basin, Oregon, requires determining the low-flow characteristics of streamflow resulting from (1) unregulated (natural) conditions and (2) regulated (by existing or alternative reservoir system) conditions. This report describes (1) a method for estimating monthly streamflow for natural conditions and (2) the use of a reservoir-system model to simulate monthly streamflow for regulated conditions. A 4-year period (1970-73) is used to verify the applicability of the U.S. Army Corps of Engineers' HEC--3 reservoir-system model for the Willamette River basin. Modeling errors are computed as the differences between model results and observed streamflow at Salem, Oreg. These errors, although possibly subject to further reduction, are considered to be within reasonable limits. (Woodard-USGS)
W77-03891

HYDROLOGIC UNIT MAP--1974, STATE OF COLORADO.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W77-03893

HYDROLOGIC EFFECTS OF HYPOTHETICAL EARTHQUAKE-CAUSED FLOODS BELOW JACKSON LAKE, NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
For primary bibliographic entry see Field 8E.
W77-03895

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
H. J. A. Neu.
Hydrological Sciences Bulletin, Vol 21, No 3, p 433-444, September 1976. 9 fig, 1 tab, 9 ref.

Descriptors: *St Lawrence Seaway, *St Lawrence River, *Effects, *Canada, *Hydroelectric plants, Runoff, Oceans, Gulfs, Rivers, Estuaries, Heat budget, Seasonal, Discharge(Water), Environmental effects, Ecology, Balance of nature, Environment.
Identifiers: *Runoff regulation, *Hydro-power, *Gulf of St Lawrence.

It has not yet been recognized that modification of the natural seasonal discharge of rivers might result in significant consequences to the ecology of the adjacent marine environment. An example of such regulation is the St. Lawrence system, where, in order to optimize power production, large quantities of water from the spring runoff are retained in storage lakes and returned to the river during the low natural discharge period of autumn and winter. It is estimated that under present conditions, the spring and summer runoff at the entrance to the Gulf of St. Lawrence has been reduced by between one-third and one-half. This drastic alteration of the natural pattern of runoff causes significant changes in the physics and dynamics of the waters of the Estuary, Gulf, and adjacent coastal region. It was argued that such modifications produce a profound impact on the biological balance of the whole ecosystem as well as changes in the seasonal heat budget. The indications are that hydro-power, which has been considered a 'clean' resource, might prove to be less 'clean' than has been assumed. (Roberts-ISWS)
W77-03974

CHANGE IN SOME ELEMENTS OF THE RIVER REGIME IN THE LOWER OB' REGION UPON FLOW REGULATION (IN RELATION TO THE REDISTRIBUTION OF WATER RESOURCES IN THE CENTRAL REGION),
Akademiya Nauk SSSR Moscow. Institut Geografii.
For primary bibliographic entry see Field 4A.
W77-03989

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03993

HYDRAULICS OF SLOPE EROSION BY OVERLAND FLOW,
Gifu Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03994

MULTIVARIABLE FLOOD LEVEL FREQUENCY DISTRIBUTIONS,
Dillon (M. M.), Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 8B.
W77-03996

2F. Groundwater

ANALYSIS OF ONE-DIMENSIONAL NON-DARCY VERTICAL INFILTRATION,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
M. A. Gill.
Journal of Hydrology, Vol. 31, No. 1/2, p 1-11, September 1976. 6 fig, 9 ref.

Descriptors: *Porous media, *Infiltration, *Infiltration rates, *Mathematical studies, *Turbulent flow, *Transition flow, Analysis, Seepage, Laminar flow, Velocity, Groundwater recharge, Equations, Hydraulics, Fluid friction.

Turbulent and transitional regimes of vertically downward infiltrating flows through porous media were analyzed. Numerical results of some typical problems were presented and compared with results of laminar or Darcy infiltration. The general trend of non-Darcy infiltration was shown to be similar to that of Darcy infiltration. Turbulent infiltration in multi-layered porous materials was also described, and a specific case of infiltration in a two-layer porous medium was presented. (Adams-ISWS)
W77-03752

A SUBSURFACE STUDY OF THE MESA GEOTHERMAL ANOMALY, IMPERIAL VALLEY, CALIFORNIA,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
H. T. Black.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 082, Price codes: A04 in paper copy, A01 in microfiche. Report NSF-RA-N-75-126, May 5, 1975. 64 p, 14 fig, 1 tab, 34 ref. NSF AER74-03429.

Descriptors: *Geothermal studies, *Wells, *California, *Thermal water, Geology, Groundwater, Salinity, Temperature, Density, Porosity, Aquifers, Core logging, Permeability, Hydrology, Sands, Sandstones.
Identifiers: *Mesa Geothermal Anomaly(Calif), *Imperial Valley(Calif).

A subsurface study of the geological characteristics of the Mesa Anomaly was carried out based largely on well logs and histories of five geothermal wells in the area. The coincident resistivity thermal and gravity anomalies are connected with the presence of hot, saline water convecting in a hydrothermally altered fractured system. The system is apparently associated with the intersection of several near-vertical faults. Hot water rising from depth in the fault zone region spreads laterally below the 2,500 ft level merging with the regional northwestern groundwater flow pattern. (Sims-ISWS)
W77-03771

ANALYTIC SOLUTIONS FOR DRAWDOWNS IN RECTANGULAR ARTESIAN AQUIFERS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W77-03854

SUMMARY APPRAISALS OF THE NATION'S GROUND-WATER RESOURCES--ARKANSAS-WHITE-RED REGION,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03877

GROUND-WATER RESOURCES OF THE HOLLOMAN AIR FORCE BASE WELL-FIELD AREA, 1967, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03878

PRELIMINARY DIGITAL MODEL OF GROUND-WATER FLOW IN THE MADISON GROUP, POWEDER RIVER BASIN AND ADJACENT AREAS, WYOMING, MONTANA, SOUTH DAKOTA, NORTH DAKOTA, AND NEBRASKA,
Geological Survey, Lakewood, Colo. Water Resources Div.
L. F. Konikow.
Water-Resources Investigations 63-75, January 1976. 44 p, 14 fig, 6 plates, 6 tab, 25 ref.

Descriptors: *Groundwater movement, *Model studies, *Computer models, *Aquifer characteristics, *Water yield, Hydrogeology, Available water, Water utilization, Forecasting, Drawdown, Pumping, River basins, *Wyoming, Montana, South Dakota, North Dakota, Nebraska.
Identifiers: Powder River basin(Wyo).

A digital simulation model was used to analyze regional ground-water flow in the Madison Group aquifer in the Powder River Basin in Montana and Wyoming and adjacent areas. Most recharge to the aquifer originates in or near the outcrop areas of the Madison in the Bighorn Mountains and Black Hills, and most discharge occurs through springs and wells. Flow through the aquifer in the modeled areas was approximately 200 cubic feet per second. The aquifer can probably sustain increased ground-water withdrawals of up to several tens of cubic feet per second, but these withdrawals probably would significantly lower the potentiometric surface in the Madison aquifer in a large part of the basin. (Woodard-USGS)
W77-03882

INTRODUCTION TO GROUND-WATER HYDRAULICS--A PROGRAMED TEXT FOR SELF-INSTRUCTION,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 8B.

W77-03884

DISTRIBUTION AND TREND OF NITRATE, CHLORIDE, AND TOTAL SOLIDS IN WATER IN THE MAGOTHY AQUIFER IN SOUTHEAST NASSAU COUNTY, NEW YORK, FROM THE 1950'S THROUGH 1973,
Geological Survey, Mineola, N.Y. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03887

GROUND-WATER LEVELS IN WYOMING, 1975,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03888

GROUND-WATER RESOURCES AND GEOLOGY OF JEFFERSON COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03889

GEOTHERMAL INVESTIGATIONS IN IDAHO, PART 4, ISOTOPIC AND GEOCHEMICAL ANALSES OF WATER FROM THE BRUNEAU-GRAND VIEW AND WEISER AREAS, SOUTHWEST IDAHO,
Geological Survey, Reston, Va.; and Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 1A.
W77-03896

ALTERNATIONS OF FLOW CHARACTERISTICS WITHIN GEOTHERMAL AREAS BY TIDAL FORCES,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2L.
W77-03915

EARTHQUAKE-RELATED CHANGE OF THE HYDROGEN ION CONCENTRATION (PH) IN GROUND WATERS,
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Seismologii.
For primary bibliographic entry see Field 2K.
W77-03990

PUMPING OF AQUIFER WITH VISCOELASTIC PROPERTIES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4B.
W77-03995

UNSATURATED ZONE AND VERTICAL-FLOW COMPONENTS IN DRAINING UNCONFINED FORMATIONS,
Birmingham Univ. (England). Dept. of Civil Engineering.
T. D. Streltsova.
Journal of Hydrology, Vol 31, No 1/2, p 119-124, September 1976. 1 fig, 18 ref.

Descriptors: *Unsaturated flow, *Drainage, *Aquifers, Water table, Equations, Capillary fringe, Anisotropy, Transmissivity, Permeability, Storage coefficient, Drawdown, Diffusivity.
Identifiers: *Vertical flow.

The relation of the unsaturated zone flow components and the vertical-flow components resulting from the variable head distribution across an aquifer thickness was considered in the general flow equation for unconfined formations. (Visocky-ISWS)
W77-04000

AN APPROXIMATE SOLUTION FOR THE TRANSIENT INTERFACE IN A COASTAL AQUIFER,
Indian Inst. of Tech., Bombay.
V. N. Vappicha, and S. H. Nagaraja.
Journal of Hydrology, Vol. 31, No. 1/2, p 161-173, September 1976. 7 fig, 1 tab, 7 ref.

Descriptors: *Equations, *Aquifers, *Coasts, *Saline water-freshwater interfaces, Saline water intrusion, Mathematical models, Numerical analysis, Computers, Analog models, Groundwater movement, Dupuit-Forchheimer theory, Boundaries(Surfaces).
Identifiers: *Sea water wedge, *Coastal aquifers.

The transient interface phenomenon in sea water intrusion into coastal aquifers leads to the solution of nonlinear partial-differential equations involving large computer memory and computer time. Adopting the principle of quasi-steady state analysis, the basic equation was formulated as an ordinary differential equation of first order. The equation was solved analytically and numerically for three different boundary conditions. The solution was compared with experimental results from a viscous-flow analog model. The method led to an approximate, but simple, solution for a rough estimate of the rate of movement of the interface and length of intrusion. (Visocky-ISWS)
W77-04001

2G. Water In Soils

THE INFLUENCE OF SOIL CONDITIONERS ON THE LIQUID-SOLID CONTACT ANGLES OF SANDS AND SILT LOAMS,
Ghent Rijksuniversiteit (Belgium). Soil Physics, Soil Conditioning and Horticultural Soil Sciences Lab.; and Ghent Rijksuniversiteit (Belgium). Faculteit Landbouwwetenschappen.
R. Hartmann, H. Verplancke, and M. De Boodt.
Soil Science, Vol. 121, No. 6, p. 346-352, 1976. 5 fig., 5 tab., 17 ref.

Descriptors: *Wettability, *Soil physical properties, *Soil water movement, *Moisture content, Physical properties, Soils, Soil types, Silts, Loam, Sands, Soil properties, Soil physics, Pervious soils, Capillary action, Infiltration, Evaporation, Permeability, Soil moisture.
Identifiers: *Soil conditioners.

A study was conducted to compare and discuss some selected methods and to find a reliable method to provide a uniform basis for describing the changes in wettability or water repellency and related water transport phenomena after the addition of soil conditioners. The influence of soil conditioners on the liquid-solid contact angle, being an index of the hydrophyilic properties of the soil, was studied on sand and silt loam treated with three different soil conditioners: a bitumen emulsion, a polyvinyl alcohol solution, and a polyacrylmide solution. The results are presented. The bitumen emulsion gave a highly hydrophobic character to the sand as well as to the silt loam. Treatment with the polyvinyl alcohol and the polyacrylamide polymers had a different effect on both textures. Sandy soil became hydrophobic, whereas silt loam grew more hydrophilic. Further study is suggested before remedial treatments for improving infiltration into soil or reducing evaporation rate can be prescribed. (Jamail-Arizona).
W77-03626

SOIL MOISTURE RESPONSE TO SEVERAL LEVELS OF FOLIAGE REMOVAL ON TWO UTAH RANGES,
Oregon State Univ., Corvallis. Rangeland Resources Program.
J. C. Buckhouse, and G. B. Coltharp.
Journal of Range Management, Vol. 29, No. 4., p 313-315, July, 1976. 3 fig, 2 tab, 10 ref.

Descriptors: *Soil moisture, *Moisture content, *Grazing, *Range management, Watershed management, Moisture, Moisture availablility, Moisture stress, Stress, Ranges, Water loss, Soil water movement, Transpiration, Wheatgrasses, Soil moisture meters, Livestock, Water yield, *Utah.
Identifiers: *Foliage removal.

There has been considerable speculation concerning the effect of foliage removal on soil moisture regime. Some investigators suggest that foliage removal by livestock results in reduced transpiration rates, which in turn reduce soil water losses and thus create a potential for increased water yield. Other studies indicate that foliage removal may contribute to reduced infiltration, increased surface runoff, and increased evaporation from the soil surface. A study was conducted to investigate the effects of light, medium and heavy levels of foliage removal (simulated grazing) on the soil moisture of two grassland locations. The results presented indicate that extreme grazing resulting in complete denudation may promote increased soil moisture in some instances. This would not be an advisable practice, however, because of increased danger from flooding. It would seem from these studies that moderate or light levels of foliage removal will allow livestock use while not significantly changing soil moisture patterns. Further research is suggested into the relationship between livestock grazing and soil moisture. (Jamail-Arizona).
W77-03629

EFFECT OF MOISTURE CONTENT ON SOIL CONSISTENCY,
Cairo Univ., Giza (Egypt). Faculty of Agriculture.
M. F. Kandil, M. M. Abdalla, and W. A. Abo-Zied.
Egyptian Journal of Soil Science, Vol. 15, No. 1., p 19-30, 1975. 3 fig, 7 tab, 12 ref.

Descriptors: *Moisture content, *Soil moisture, *Soil structure, *Moisture tension, *Soil physics, Soils, Soil water, Soil texture, Soil types, Salts, Alkaline soils, Clays, Plant growth, Moisture, Porosity, Gypsum, Cation exchange, Cations, Calcium compounds, Soil surfaces.
Identifiers: *Soil consistency.

Soil consistency is one of the important soil characteristics affecting ease of tillage operations as well as other soil management practices. The moisture content of the soil is the main variable in the regulation of soil consistency. If soil moisture is too high, the soil will puddle easily; if it is too low, more power is needed to work the land. Experiments were carried out to investigate the factors influencing the effect of moisture on the consistency of Nile alluvium in order to bring about the proper moisture content for soil workability and its regulation. Several soil samples were analyzed, the breaking strength for each sample at different moisture contents determined, and the correlation coefficient calculated. At a given moisture content, the breaking strength value increases with clay content. Removal of excess salts is necessary for normal plant growth, but this also allows dispersion of the soil and increased hardness which can be regulated through the proper use of organic matter and/or calcium salts such as gypsum. (Jamail-Arizona)
W77-03631

RATES OF UREA HYDROLYSIS IN FIVE SOILS OF INDIA,
Haryana Agricultural Univ., Hissar, (India). Dept. of Soils.
S. D. Sankhayan, and U. C. Shukla.
Geoderma, Vol. 16, p 171-178, September, 1976. 4 fig, 2 tab, 17 ref.

Descriptors: *Ureas, *Hydrolysis, *Alkaline soils, *Soil moisture, Nitrogen compounds, Fertilizers, Soil types, Soils, Calcareous soils, Sands, Moisture content, Soil water movement, Loam,

Mathematical models, Organic soils, Conductivity, Soil chemical properties, Electrical conductance.
Identifiers: *India.

The rate of urea hydrolysis as affected by kind of soil, moisture levels and urea nitrogen levels was studied. Five bulk soil samples were collected and prepared for study in a greenhouse. Samples were analyzed for their mechanical composition, pH, electrical conductivity and organic carbon. Water holding capacity, calcium carbonate, and total nitrogen were ditermined; the rate of urea hydrolysis was then calculated and results presented. Most of the urea added to soil samples hydrolyzed within 24 hours. The rate of hydrolysis was faster at 40 percent of water holding capacity than at 60 percent, and was slower in soil samples with higher organic matter contents or electrical conductivity. The amounts of urea applied also influenced hydrolysis. The time required for urea hydrolysis increased with increases in the amount of urea applied, but not in the same proportion. Hydrolysis was found to follow a first order reaction. (Jamail-Arizona)
W77-03632

DESERTIFICATION AND THE SALINITY PROBLEM IN AUSTRALIA,
University of New England, Armidale (Australia). Dept.of Geography.
For primary bibliographic entry see Field 4C.
W77-03741

THE ORGANIC COMPONENT OF WIND-BLOWN SOIL AEROSOL AS A FUNCTION OF WIND VELOCITY,
Rutgers - The State Univ., New Brunswick, N.J.
S. T. Zenchelsky, A. C. Delany, and R. A. Pickett, II.
Soil Science, Vol 122, No 3, p 129-132, September 1976. 2 fig, 2 tab, 7 ref.

Descriptors: *Aerosols, *Erosion, *Winds, *Organic matter, Organic compounds, *Organic soils, Clays, Particle size, Sampling, Analysis, Chemical analysis, Soil analysis, Velocity, Dusts, Dust storms, *Texas.
Identifiers: *Wind erosion(Soils), Total organic carbon.

Windblown soil aerosol, generated during three dust storms in March 1974, was collected at 1.5 m above the surface in Plains, Texas, during periods of different wind velocities. A cascade impactor permitted separation into five size-fractions, four of them covering the range of particle radii from 0.21 through 3.4 micrometers. The total organic carbon (TOC) in each size range was determined by a wet oxidation method that measures the resultant CO2 in an infrared cell. For the aerosol, the mass distribution of TOC decreases with increasing particle size at all three of the wind velocities studied (7.3 m/sec, 9.3 m/sec, and 11.4 m/sec). The percentage of TOC in each size fraction decreases with increasing wind velocity although the corresponding particulate concentrations increase. Moreover, the aerosol is enriched in TOC compared with the bulk parent soil. The amount of enrichment is greatest for the smallest particle size. The enrichment factor, integrated over all sizes, varies between 1 and 10 depending upon wind velocity. These data are consistent with results obtained at 3.5 m using a different sampling and sizing method. Microscopic examination of the aerosol reveals vegetative residue in all fractions, although its contribution to the TOC appears to be small. (Sims-ISWS)
W77-03763

LABORATORY TECHNIQUES IN THE PREDICTION OF SOIL ERODIBILITY,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-03827

TIME OF PONDING--COMPARISON OF RESULTS OF THE PARLANGE SOLUTION WITH THE SMITH AND MEIN-LARSON MODELS,
Indian Inst. of Tech. Bombay. Dept. of Civil Engineering.
J. T. Panikar, and G. Nanjappa.
Journal of Hydrology, Vol. 31, No. 1/2, p 175-179, September 1976. 1 fig, 1 tab, 6 ref.

Descriptors: *Ponding, *Infiltration, Computers, *Model studies, Rainfall intensity, Diffusivity, Numerical analysis, Moisture content, Pore pressure, *Equations, *Simulation analysis, Soil moisture.
Identifiers: *Parlange equation, Relative rainfall, Smith's model.

Parlange presented an expression in 1972 to derive time to ponding after the beginning of a constant intensity rainfall on the surface of an initially dry soil. Smith, and later Mein and Larson, modeled infiltration during a steady rain. The results obtained with these models were compared with those from the Parlange equation for relative rainfall intensities varying from 1.002 to 1000. The digital computer simulation results indicated that both models yield results comparable to those from the Parlange equation for high values of relative rainfall, but for values less than 3, time to ponding was less with the models. (Singh-ISWS)
W77-03855

SOIL MOISTURE MOVEMENT BY TEMPERATURE GRADIENT,
Auckland Univ. (New Zealand). Dept. of Civil Engineering.
A. J. Raudkivi, and N. Van U'u.
Journal of the Geotechnical Engineering Division, American Society of Civil Engineers, Vol. 102, No. GT12, Proceedings Paper 12645, p 1225-1244, December 1976. 7 fig, 1 tab, 58 ref, 2 append.

Descriptors: *Diffusion, *Heat transfer, *Finite element analysis, Numerical analysis, *Soil moisture, Temperature, Testing, Thermocline, Movement, *Moisture content, *Model studies.
Identifiers: *Base courses, *Finite differences, Roadbeds, Adsorbed water, Vapor phase.

Results from a one-dimensional analytical model and from experiments showed that redistribution of moisture due to temperature gradients was maximum when initial saturation was about 20%. Increase in moisture at the cold end was on the order of 0.03 g/cu cm or 1.2% by weight after 3 days at a temperature gradient of 0.9C/cm, and about 80% of the increase occurred in the first day. At low moisture content, the adsorbed water was held firmly, relative to diffusion due to vapor concentration gradient, and only insignificant redistribution took place. A layer of fine, initially dry material absorbed water until all the adsorbed water requirements were satisfied. Since the vertical movement of moisture due to temperature gradients was found to be insignificant, any buildup of moisture in the basecourse must have resulted from other causes, either seepage through the top seal or lateral movement. For lateral movement, temperature gradients could have been important because movement from berms under the cooler seal at nighttime was followed by movement vertically down during the day, which possibly led to eventual moisture accumulation. (Roberts-ISWS)
W77-03861

PUMPING OF AQUIFER WITH VISCOELASTIC PROPERTIES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4B.
W77-03995

WEED CONTROL AND THE ENVIRONMENT, (IN FRENCH),
Organisation Europeenne et Medterraneenne pour la Protection des Plantes.
For primary bibliographic entry see Field 5B.
W77-04041

2H. Lakes

THE EFFECT OF THE CENTRAL ARIZONA PROJECT ON THE THERMAL STRUCTURE OF LAKE HAVASU,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. K. Kreamer.
Master of Science Thesis, 1976. 73 p, 19 fig, 3 tab, 19 ref, 4 append.

Descriptors: *thermal properties, *Thermal stratification, *Lakes, *Water quality, *Destratification, Temperature, Water pollution, Water pollution effects, Colorado River, Reservoirs, Turbidity, Inflow, Stratification, *Arizona, Simulation analysis, Model studies, Climatic data, Water storage, Solar radiation.
Identifiers: *Lake Havasu(Ariz), *Central Arizona Project.

Thermal stratification is a layering of lake waters due to differences in temperature-dependent density. A temperature-stratification model developed by the U.S. Army Corps of Engineers, Hydrologic Engineering Center, was used to predict the changes in the temperature profile of Lake Havasu on the Colorado River near Parker, Arizona, that may occur with the withdrawal of Central Arizona Project water in the 1980's. Thermal stratification of Lake Havasu has ramifications relating to the water quality of the lake and its outlets. The computer simulation model was calculated using maximum withdrawal conditions. Inputs for the program included monthly evaporation and precipitation, monthly average air temperature, solar radiation at the top of the atmosphere, water inflow amount and temperature, water outflow amount and location, water temperature profiles, and physical reservoir data. The results are presented and indicate that the stratification changes will be of low magnitude. (Jamail-Arizona)
W77-03624

HEAVY METAL CONCENTRATIONS AND DISTRIBUTIONS IN RIVER MOUTH SEDIMENTS AROUND THE GREAT LAKES,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. for Environmental Studies and Engineering.
For primary bibliographic entry see Field 5B.
W77-03650

ARTIFICIAL AND NATURAL LAKES,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03694

ESTIMATE OF THE SUITABILITY OF TELEVISION INFORMATION FROM METEOROLOGICAL METEOR SATELLITES FOR DETERMINING ICE CONDITIONS IN LAKES AND RESERVOIRS,
For primary bibliographic entry see Field 2C.
W77-03765

THE EFFECTS OF AGRICULTURAL RUN-OFF AND SILTATION ON A NEW RECREATIONAL LAKE,
Illinois State Univ., Normal. Dept. of Biological Sciences; and Illinois State Univ., Normal. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03766

WATER POLLUTION INVESTIGATION: DETROIT AND ST. CLAIR RIVERS.
Environmental Control Technology Corp., Ann Arbor, Mich.
For primary bibliographic entry see Field 5G.
W77-03783

A COMPENDIUM OF LAKE AND RESERVOIR DATA COLLECTED BY THE NATIONAL EUTROPHICATION SURVEY IN THE NORTHEAST AND NORTHCENTRAL UNITED STATES.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-03784

AN INVESTIGATION INTO THE EFFECTS OF FORESTRY PLANTATIONS ON THE WATER QUALITY OF UPLAND RESERVOIRS IN NORTHERN IRELAND,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
For primary bibliographic entry see Field 5B.
W77-03840

LAKE ERIE TERRESTRIAL RADIATION,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
J. A. Derecki.
Water Resources Research, Vol. 12, No. 5 p 979-984, October 1976. 1 fig, 4 tab, 9 ref.

Descriptors: *Radiation, *Lake Erie, *Air temperature, *Humidity, Water, Solar radiation, Vapor pressure, Water temperature, Average, Monthly, Lakes.
Identifiers: *Net back radiation, *Terrestrial radiation, Incident radiation, Water surface temperature, Reflected radiation, Emitted radiation, Average monthly radiation values.

Terrestrial or long-wave radiation over a body of water consists of the atmospheric radiation, with incident and reflected components, and the radiation emitted by the water body. These three radiation components produce a net back radiation, an energy loss from the water to the atmosphere. Basic required data (air temperature, humidity, solar radiation, and water surface temperature) were derived, and long-term (17 years) average monthly radiation values were calculated for the Lake Erie incident and reflected atmospheric radiation and the radiation emitted by the water body. The net result, or the effective net back radiation, averaged 100 Ly/d from 1952 to 1968. (Jones-ISWS)
W77-03858

CHEMICAL AND PHYSICAL DATA FOR THE FLAMING GORGE RESERVOIR AREA, UTAH AND WYOMING, 1973-75,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 7C.
W77-03881

ANALYSIS OF POLLUTION FROM MARINE ENGINES AND EFFECTS ON THE ENVIRONMENT. SOUTHERN LAKES,
Environmental Science and Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5C.
W77-03900

A REPORT ON THE METHYLMERCURY SITUATION IN PAR POND,
Georgia Univ., Athens. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W77-03954

SEICHES, CIRCULATION, AND STORM SURGES OF AN ICE-FREE LAKE WINNIPEG,
Canada Centre for Inland Waters, Burlington (Ontario).
P. F. Hamblin.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2377-2391, October 1976. 17 fig, 13 ref.

Descriptors: *Seiches, *Storm surge, *Water circulation, *Lakes, *Canada, Model studies, Mathematical models, Winds, Equations, Circulation, Water levels, Physical properties, Storms, Limnology.
Identifiers: *Lake Winnipeg(Canada).

Predictions of numerical hydrodynamical models of seiches, steady circulation, and water level setup and time-dependent motions known as storm surges were compared to limited amounts of water level data during the ice-free season on Lake Winnipeg. Two-dimensional gravitational seiches were computed by minimizing an expression for the total energy. The fundamental inviscid period is 39 h, which is considered to be a maximum for any inland water body. Four higher modes of oscillation were detected in spectra of water level fluctuations at three stations on Lake Winnipeg. Frictional effects were shown to have appreciable influences on the seiches. Predicted water level setup had an asymmetrical distribution, with the largest excursions occurring in the southern basin. A number of observations of water level setup were in accordance with model predictions at Winnipeg Beach if a drag coefficient of 0.001 is assumed. Setup is relatively insensitive to vertical eddy diffusivities in the range 10-100 sq cm/s. A modeling strategy utilizing the previously obtained solutions for the free oscillations and for the steady state setup resulted in a simple prediction scheme for arbitrary forcing in time involving the convolution of the time history of the wind stress components with the response of the lake. Predicted storm surges were in reasonable agreement with two storm surges measured at two locations in the southern basin, considering the imperfect knowledge of the forcing obtained from winds at a single station in the northern basin. (Sims-ISWS)
W77-03987

UNSTEADY STRATIFIED CIRCULATION IN A CAVITY,
Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
D-L. Young, J. A. Liggett, and R. H. Gallagher.
Journal of the Engineering Mechanics Division, American Society of Civil Engineers, Vol. 102, No. EM6, Proceedings Paper No. 12643, p 1009-1023, December 1976. 11 fig, 15 ref, 2 append. NSF GK-23992.

Descriptors: *Circulation, *Density, *Thermal stratification, *Unsteady flow, *Finite element analysis, Model studies, Hydraulics, Lakes, Thermocline, Temperature, Winds, Numerical analysis, Stratification, Equations, Mathematical models.
Identifiers: *Lake circulation, Two dimensional flow, Wind shear.

A transient two-dimensional model with idealized topography (i.e., cross section of a rectangular lake) was examined using numerical models. The primary results define the behavior of the circulation and temperature distribution under a variety of circumstances. It was demonstrated that multiple circulation cells are likely to form in a basin with a broad and diffusive metalimnion, a strong and stable density stratification, and a modest wind stress. The present model was able to predict the formation, maintenance, and erosion of thermocline. The wind-driven current was observed to play a striking role in the development of thermocline. The current accelerates the establishment and contributes to the erosion of thermocline, which is in contrast to the one-dimensional pure diffusion model in which the circulation plays no role. (Adams-ISWS)
W77-04003

GLACIAL LAKE SEDIMENTATION, AUSTERDALSISEN, NORWAY,
Manchester Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 2J.
W77-04005

IRON TRANSPORT IN A LAKE TAHOE TRIBUTARY AND ITS POTENTIAL INFLUENCE UPON PHYTOPLANKTON GROWTH,
California Univ., Richmond. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 5B.
W77-04022

NITROGEN AND PHOSPHOROUS REMOVAL FROM LAKES BY FISH HARVEST,
British Columbia Dept. of Recreation and Conservation, Penticton. Fish and Wildlife Branch.
For primary bibliographic entry see Field 5G.
W77-04035

HYDROCARBONS IN A WILDERNESS LAKE,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
For primary bibliographic entry see Field 5B.
W77-04048

STUDY OF THE PRODUCTION PROCESS OF DAPHNIA LONGIREMIS SARS POPULATION FROM LAKE DALNEE BY MEANS OF A MATHEMATICAL MODEL, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Physiology.
For primary bibliographic entry see Field 5C.
W77-04055

MICROBIAL PROCESSES OF PHENOL DEGRADATION IN THE VOLGA AND ITS RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 5C.
W77-04064

RADIOECOLOGICAL STUDY OF CHAROPHYTA, (IN RUSSIAN),
Akademiya Nauk Litovskoi, SSR, Vilnius. Inst. of Botany.
For primary bibliographic entry see Field 5C.
W77-04068

PRIMARY PRODUCTION OF GREEN FILAMENTOUS ALGAE FROM THE KIEV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W77-04070

MEROMICTIC MECHANISMS IN A COASTAL LAKE, (IN FINNISH),
Abo Akademi, Turku (Finland). Inst. of Biology.
For primary bibliographic entry see Field 5C.
W77-04071

ODOROUS COMPOUNDS IN RAW WATER OF WATER SUPPLIES: IDENTIFICATION OF CAMPHOR AND P-METHYLACETOPHENONE, (IN JAPANESE),
Toyama Univ. (Japan). Research Inst. for Wakanyaku.
For primary bibliographic entry see Field 5A.
W77-04078

2I. Water In Plants

PHYSIOLOGICAL RESPONSES TO RAINFALL IN OPUNTIA BASILARIS (CACTACEAE),
California Univ., Riverside. Dept. of Biology.
S. R. Szarek, and I. P. Ting.
American Journal of Botany, Vol. 62, No. 6, p 602-609, 1975. 9 fig, 1 tab, 30 ref.

Descriptors: *Rainfall, *Cacti, *Desert plants, *Moisture deficit, *Moisture stress, Precipitation(Atmospheric), Stomata, Carbon dioxide, Organic acids, Arid lands, Photosynthesis, Leaves, Nocturnal, Diurnal, Water utilization, Droughts, Adaptation, Plant physiology.
Identifiers: *Crassulacean acid metabolism, Mesophyll resistance.

Crassulacean acid metabolism permits a reduced level of metabolic activity to persist throughout the year despite the cessation of atmospheric gas exchange during drought conditions. The adaptive significance of the maintenance of a reduced level of metabolic activity throughout periods of drought is investigated and the physiological response of a succulent to rainfall is reported. A field study was conducted on Opuntia basilaris. Transpiration resistance, radioactive carbon dioxide assimilation, boundry and stomatal resistance to carbon dioxide transfer, and plant and soil water potentials were determined. The results are presented. An immediate, marked response to small amounts of rainfall occurs in Opuntia basilaris despite previous drought conditions. The effect of rainfall is upon plant water potential. Nocturnal stomatal opening is initiated following rainfall, and stomata remain open during the daytime. Thus, crassulacean acid metabolism enables a rapid physiological response to small amounts of rainfall despite previous long periods of environmental drought conditions. (Jamail-Arizona)
W77-03622

ISOLATION AND CHARACTERIZATION OF DROUGHT TOLERANCE IN A GRAIN SORGHUM (SORGHUM BICOLOR (L) MOENCH) RANDOMMATING POPULATION,
Arizona Univ., Tucson. Dept. of Plant Sciences.
H. J. Hill, Jr.
Master of Science Thesis, 1976. 98 p, 9 ffig, 31 tab, 85 ref, 2 append.

Descriptors: *Grain sorghum, *Drought resistance, *Moisture stress, *Crop response, *Drought tolerance, Droughts, Plant physiology, Dehydration, Plant growth, Stomata, Transpiration, Crop production, Leaves, Sorghum, Irrigation, Plant morphology, Precipitation(Atmospheric), Rainfall, Agronomic crops, Stress, Moisture content.

Experiments were conducted on grain sorghum to : (1) evaluate the potential of a phenotypic selection procedure to isolate superior drought-tolerance genotypes; (2) to determine what morphological characteristics these superior drought-tolerant genotypes possess; and (3) to explore the relationship between transpiration and drought-tolerance in grain sorghum. A randommating population of grain sorghum was divided, with one half of the population exposed to water stress and one half exposed to normal water conditions for three generations. Fifteen lines were selected from the lines developed in each of the two soil moisture regimes. All thirty genotypes were field tested under both normal water and water stress conditions. The lines selected under water stress conditions were significantly higher in grain yield, taller in height, earlier in maturity, and lower in leaf area of the top six leaves than the lines selected under normal moisture conditions. Similar results were obtained from a greenhouse study. The combined results of the greenhouse and field studies indicate that the ability to yield well under drought conditions may be a function of the inherent yield potential of a line, rather than drought-tolerance. (Jamail-Arizona)
W77-03623

YIELD RESPONSES OF TWO MAIZE CULTIVARS FOLLOWING SHORT PERIODS OF WATER STRESS AT TASSELING,
Buenos Aires Univ. (Argentina). Dept. of Ecology.
For primary bibliographic entry see Field 3F.
W77-03628

EFFECT OF WATER DEFICIT ON CARBON DIOXIDE EXCHANGE AND LEAF ELONGATION RATE OF PANCIUM MAXIMUM VAR. TRICHOGLUME,
Commonwealth Scientific and Industrial Research Organization, St. Lucia (Australia). Cunningham Lab.
M. M. Ludlow, and T. T. Ng.
Australian Journal of Plant Physiology, Vol. 3, No. 3, p. 401-413, May, 1976. 10 fig, 1 tab, 30 ref.

Descriptors: *Moisture stress, *Moisture deficit, *Moisture uptake, *Water utilization, Leaves, Moisture, Photosynthesis, Water loss, Stress, Moisture availability, Respiration, Stomata, *Grasses, *Pastures, Plant physiology, Energy conversion, Water shortage, Arid lands, Tropical regions, Subtropic, Semiarid climates.
Identifiers: Leaf water potential.

Seasonal water shortage is the greatest climatic limitation to the growth of Carbon 4 pasture grasses in tropical and subtropical areas. Even on soils at field capacity, transitory leaf water uptake deficits occur daily when atmospheric demand exceeds capacity of water uptake. Experiments were conducted to investigate the influence of water deficits on photosynthesis, growth, and chemical composition of a widely used tropical Carbon 4 pasture grass, Panicum maximum var. trichoglume. In addition, because field grown plants respond differently to water deficits than do plants grown under controlled conditions, the influence of nutrient supply, environmental conditions during growth, and stress history of the response of these processes to water deficits were investigated. The responses of carbon dioxide exchange and leaf expansion to the water deficits do not differ greatly from those of a wide range of herbaceous and woody Carbon 3 plants. They do, however, differ from those plants adapted to semiarid and arid areas, irrespective of whether they are Carbon 3 or Carbon 4. Thus, the Carbon 4 syndrome does not appear to be associated with a particular known response to water dificit which would confer an ecological advantage under hot, dry conditions. More research is suggested before the full significance of the Carbon 4 syndrome can be determined. (Jamail-Arizona).
W77-03630

MOISTURE USE EFFICIENCY OF DRYLAND CROPS AS INFLUENCED BY FERTILIZER USE, III. OILSEED CROPS,
Central Arid Zone Research Inst., Jodhpur (India). Dry Farming Research Main Centre.
For primary bibliographic entry see Field 3F.
W77-03634

ESTIMATING RELATIVE LEAF WATER CONTENT WITH A SIMPLE BETA GAUGE CALIBRATION,
Soil Conservation Service, Klamath Falls, Oreg.
For primary bibliographic entry see Field 7B.
W77-03635

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-I. COMPUTER MODEL AND ITS EVALUATION USING WIND-TUNNEL EXPERIMENTS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W77-03757

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-II. SIMULATED EFFECT OF VARIATIONS IN ENVIRONMENTAL CONDITIONS, LEAF PROPERTIES, AND SURFACE WATER CHARACTERISTICS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W77-03758

THE CEPHALOPODA. PART I: OEGOPSIDA; PART II: MYOPSIDA, OCTOPODA,
For primary bibliographic entry see Field 2L.
W77-03776

2J. Erosion and Sedimentation

RAINFALL EROSIVITY ANALYSIS OF SOIL CONSERVATION RESEARCH CENTRE, VASAD(GUJARAT),
Guiarat Soil Conservation Research, Demonstration and Training Centre, Vasad (India).
For primary bibliographic entry see Field 4D.
W77-03627

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON TRANSPORT OF PERSISTENT CHEMICALS IN AQUATIC ECOSYSTEMS.
National Research Council of Canda, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W77-03642

THE DISTRIBUTION AND TRANSPORT OF MERCURY IN THE SEDIMENTS OF THE LAURENTIAN GREAT LAKES SYSTEM,
Canada Centre for Inland Waters,Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W77-03643

TRANSVERSE DISPERSION IN MEANDERING CHANNELS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2E.
W77-03644

THE DISTRIBUTION AND TRANSPORT OF BED SEDIMENTS AND PERSISTENT POLLUTANTS IN THE OTTAWA RIVER, CANADA,
Ottawa Univ. (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 5B.
W77-03645

THE ROLE OF FLOCCULATION IN THE TRANSPORT OF PARTICULATE POLLUTANTS IN THE MARINE ENVIRONMENT,
Bedford Inst., of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5B.
W77-03646

MERCURY TRANSPORT BY BED SEDIMENT MOVEMENTS,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03647

PHYSICAL EXCHANGE IN STREAM ECOLOGY STUDIES,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.

T. P. H. Gowda.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-53-I-58, 1 fig, 2 tab, 2 append, 15 ref.

Descriptors: *Ecology, *Flow, River flow, Streamflow, Flocculation, Particle size, Mixing, Diffusion, Sediment transport.

A brief review of the theoretical aspects of physical exchange is presented with particular emphasis on the importance of the fundamental parameters of flow in ecology studies. The significance of the flocculation phenomenon in the Ottawa River is analyzed. The analysis for the river as a whole shows that the Brownian motion is mainly responsible for the aggregation of particles in the river where the particles are of the size of micron. However, in shore regions, the flocculation phenomenon may be more significant. (See also W77-03642) (Chilton-ORNL)
W77-03648

HEAVY METAL CONCENTRATIONS AND DISTRIBUTIONS IN RIVER MOUTH SEDIMENTS AROUND THE GREAT LAKES,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. for Environmental Studies and Engineering.
For primary bibliographic entry see Field 5B.
W77-03650

HEAVY METAL POLLUTANTS IN THE SEDIMENTS OF THE RHONE RIVER,
Geneva Univ. (Switzerland). Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W77-03651

TRANSPORT OF SOME ORGANOCHLORINES IN B. C. WATERS,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03653

HEAVY METALS IN THE LOWER MISSISSIPPI,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
For primary bibliographic entry see Field 5B.
W77-03654

SUSPENDED SOLIDS AND VELOCITY DISTRIBUTIONS IN THE OTTAWA RIVER,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
R. G. Warnock, and S. I. Khan.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-99-I-104, 9 fig.

Descriptors: *Sediment transport, Sedimentation, *Suspended solids, Current meters, Velocity, *Canada, Rivers, *Measurement.
Identifiers: *Ottawa River(Canada).

Velocity measurements were made over a five year period with a rotating-type meter which measures velocity in a horizontal plane. The variation of velocity with depth (plotted in a non-dimensional form) was used to estimate depth-averaged velocity from surface velocity measurements. A float survey method was found to be satisfactory for determining transverse distributions of mean velocity (in the vertical) reasonably well. Measurements of suspended solids showed that values were usually high in spring, lower in the late summer and somewhat higher in the fall. Little variation of suspended solids was found with depth although some lateral variations (caused by tributary inflows or local effluents) were observed. (See also W77-03642) (Chilton-ORNL)
W77-03655

ADSORPTION OF C14-DDT TO PARTICLE SURFACES,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 5B.
W77-03658

TRANSPORT AND DISTRIBUTION OF MERCURY IN SEDIMENTS,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5B.
W77-03669

INTERACTION BETWEEN AQUATIC PLANTS AND RIVER BED SEDIMENTS IN THE UPTAKE OF MERCURY FROM FLOWING WATER,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-03671

LEAD TRANSPORT IN A RIVER ECOSYSTEM,
Illinois Univ. at Urbana-Champain. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03672

SEGMENTS OF A VICIOUS CIRCLE: LAND DEGRADATION AND WATER RESOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 4C.
W77-03740

LARGESCALE RIPPLES OF THE LOWER WABASH RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
R. G. Jackson, II.
Sedimentology, Vol 23, No 5, p 593-623, October 1976. 19 fig, 2 tab, 43 ref.

Descriptors: *River beds, *Geomorphology, *On-site investigations, *Illinois, *Indiana, Streambeds, Topography, Bed forms, Beds, Rivers, Channel morphology, Alluvial channels, Dunes, Sand bars, Sand waves, On-site data collections, Velocity, Currents(Water), Movement.
Identifiers: *Wabash River(Ill).

Large-scale ripples in the meandering lower Wabash River of Illinois and Indiana include scroll bars and three dunelike bed forms (dunes, sand waves, and transverse bars). Scroll bars are lobate crested, asymmetrical in streamwise vertical profile, usually solitary, and oriented approximately normal to local channel strike. They form by passive flow expansion downchannel from locally emergent topographic highs, face and lie near inner banks of meander bends, enjoy a high preservation potential as leveelike ridges of ridge-and-swale topography, and migrate only during relatively low stream discharges when water depth over bar crests is less than 0.5 m. Dunes correspond to dunes of the flow-regime classification and rarely are solitary or superimposed. Sand waves may be symmetrical or asymmetrical, are always superimposed by dunes, occur in depths greater than 4 m and bed material coarser than 1 mm mean size, and develop at bankful and flood flows. Transverse bars migrate in depths less than 5 m in straight reaches and near inner banks of bends. The omnipresence of dunes upon stoss sides of sand waves confirms the existence of an equilibrium superimposition of dunelike large-scale ripples. Depth-velocity-size diagrams appear to be a valid representation of empirical stability fields of dune-like large-scale ripples in deep, unsteady, nonuniform aqueous flows. Dune stratification displays (1) large-scale trough cross-strata, (2) thinning of sets as bed material size increases, and (3) an orientation within 20 deg of local channel strike. Transverse bars show avalanche sets up to 2 m thick with reactivation surfaces. Scroll bars display thick avalanche sets separated by reactivation structures consisting of erratically oriented small-scale trough cross-strata. Avalanche sets of scroll bars and of transverse bars are oriented respectively 50-150 deg from and within 50 deg of local channel strike. (Humphreys-ISWS)
W77-03761

A RECONNAISSANCE OF THE RECENT SEDIMENTS OF THE RANNS OF KUTCH, INDIA,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03762

THE ORGANIC COMPONENT OF WIND-BLOWN SOIL AEROSOL AS A FUNCTION OF WIND VELOCITY,
Rutgers - The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 2G.
W77-03763

LABORATORY TECHNIQUES IN THE PREDICTION OF SOIL ERODIBILITY,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W77-03827

STABILITY OF CHANNEL BEDS BY AMORING,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 8B.
W77-03836

AN EVALUATION OF SURFACE-MINE SPOILS AREA RESTORATION IN WYOMING USING RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03892

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
H. H. Chang, and J. C. Hill.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY10, Proceedings Paper 12485, p 1461-1477, October 1976. 13 fig, 11 ref, 2 append.

Descriptors: *Channels, *Computer models, *Deltas, *Erosion, *Rivers, Flood control, Hydraulics, Sedimentation, Oceans, Reservoirs, Flow, Model studies.

The existing computer program for water-surface computation and delineation of the flood limit was extended to include the effect of channel deformation during a flood. In the new program, the unsteady flow was approximated by successive temporal steady conditions; the change in channel boundary was corrected at each time step. The new computer program was applied to obtain the progressive changes of the channel boundary and water-surface profile during a flood as a result of erosion and sedimentation. By imposing an additional condition for the delta, another computer program was developed to compute the progressive growth of the delta at the river mouth and the variation of the delta stream pattern. (Bhowmik-ISWS)
W77-03993

HYDRAULICS OF SLOPE EROSION BY OVERLAND FLOW,
Gifu Univ. (Japan). Dept. of Civil Engineering.
S. Komura.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY10, Proceedings Paper 12489, p 1573-1586, October 1976. 8 fig, 2 tab, 14 ref, 2 append.

Descriptors: *Erosion, *Overland flow, *Sedimentation, *Flow, *Soil erosion, *Rill erosion, *Rainfall, Sediments, Sheet erosion, Hydraulics, Gullies, Slopes.

General equations of soil erosion by rainfall and overland flow were analytically derived by using equations of motion and continuity for sediment transport, dynamic and continuity equations for spatially varied flow with rainfall, and equations of boundary shear stress subject to rainfall. Computational equations for predicting soil erosion rates were developed from the general equations obtained. To demonstrate the applicability of computational equations, computed results were compared with previously published data on soil erosion. (Bhowmik-ISWS)
W77-03994

STOCHASTIC MODELS OF SEDIMENT MOTION ON FLAT BED,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
C. S. Hung, and H. W. Shen.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY12, Proceedings Paper 12639, p 1745-1759, December 1976. 5 fig, 2 tab, 3 ref, 3 append. NSF ENG74-03037.

Descriptors: *Sediment transport, *Model studies, *Bed load, *Stochastic processes, Channels, Hydraulics, Probability, Sediment load, Alluvial channels, Theoretical analysis, Equations.
Identifiers: *Hazard function, Sediment movement, Longitudinal sediment movement, Flat bed, Resting period, Moving period, Step length.

Plausible stochastic models for resting period, moving period, and step length were constructed to describe the longitudinal sediment motion on a flat bed under steady uniform flows. Resting period was found to be compound exponentially distributed (J-shaped) with a random hazard rate which has a monotonically decreasing probability density function. Step length and resting period were found to be exponentially distributed (J-shaped) when the flow is slow. They possess bell-shaped probability density functions when the flow is faster, and they have weak associations with the preceding resting period. (Lee-ISWS)
W77-03997

ROLLERS AND RIPPLES IN SAND, STREAMS AND SKY: RHYTHMIC ALTERATION OF TRANSVERSE AND LONGITUDINAL VORTICES IN THREE ORDERS,
Texas Univ. at Austin.
R. L. Folk.
Sedimentology, Vol 23, No 5, p 649-669, October 1976. 9 fig, 43 ref.

Descriptors: *Bed forms, *Sedimentology, *Sediment transport, *Sand waves, Model studies, Circulation, Water circulation, Movement, Sediments, Eddies, Flow, Vortices, Currents(Water), Sand bars, Ripple marks, Dunes.
Identifiers: *Hypothesis, Helicoidal flow.

Sediment ripples are caused by systematically spaced, transverse roller vortex systems in a moving fluid undergoing shear. With greater shear, these transverse rollers change over into longitudinal (helicoidal) vortices. This is the basic cause for the change from so-called 'lower flow regime' conditions to 'upper flow regime' conditions. All characteristics of these two regimes (sediment transport rate, bed form, sedimentary structures) are logically explained by attributing them to change in type of vortex system. For currents depositing sediments, there are three orders of magnitude of vortices, with each order beginning with transverse rollers and passing through festoon to longitudinal rollers. A chaos zone (antidunes) ensues, followed by resumption of transverse rollers that are five to ten times as large as those in the previous order. Features of river sediments, marine sands, turbidites, desert sand dunes, sky, and stars are satisfactorily explained by this model. (Humphreys-ISWS)
W77-03998

THE PRODUCTION AND RECOGNITION OF AEOLIAN FEATURES ON SAND GRAINS BY SILT ABRASION,
Queens Coll., Flushing, N.Y. Dept. of Earth and Environmental Sciences.
W. M. Nieter, and D. H. Krinsley.
Sedimentology, Vol 23, No 5, p 713-720, October 1976. 7 fig, 1 tab, 15 ref.

Descriptors: *Laboratory tests, *Aeolian soils, *Loess, *New York, Analytical techniques, Wind erosion, Glacial drift, Abrasion, Evaluation, Soil tests, Testing procedures, Measurement, Soil surfaces, Sands, Silts.
Identifiers: *Long Island(NY).

Several size fractions of natural loess from Long Island, New York, including sand and ventifacts, were studied with the scanning electron microscope to determine if distinguishing surface features could be found. Long Island loess compares very closely to descriptions of a number of European loess deposits except for the inclusion of carbonate not found on Long Island. Ventifact and sand grain surfaces were experimentally prepared using natural loess as an abrasive agent, and they compared well with those surfaces found in the natural materials. Given favorable circumstances, it is possible, via scanning electron microscopy, to distinguish surface features created by aeolian action in loess deposits and associated materials. (Humphreys-ISWS)
W77-03999

GLACIAL LAKE SEDIMENTATION, AUSTERDALSISEN, NORWAY,
Manchester Univ. (England). Dept. of Geography.
W. H. Theakstone.
Sedimentology, Vol. 23, No. 5, p 671-688, October 1976. 9 fig, 36 ref.

Descriptors: *Glacial sediments, *Lakes, *Glaciology, *On-site investigations, Foreign countries, Glaciers, Glacial drift, Sediments, Geomorphology, Deltas, Sedimentology, Beds, Silts, Deposition(Sediments), Lake beds.
Identifiers: *Norway(Austerdalsisen).

Sediments deposited in a lake at the front of a glacier in the Svartisen area, Norway, were studied between 1957 and 1974. Until 1959, they were almost completely covered by an outwash plain (sandur), but subsequent erosion has exposed glacial lake sediments more than 70 m deep within a rock basin about 2.5 km long and 1 km wide. The basin was filled by sand and silt carried from beneath the glacier Austerdalsisen by two rivers, each of which deposited a delta in the lake. As the deltas advanced, laminated pro-delta silt was covered by cross-beds of fine sand and silt and by near-horizontal sheets of fine sediments laid down between the delta-fronts and the distal end of the rock basin. Although both slumping and loading caused minor disturbance of sediments at the lake floor, deformation was of local significance only. Movement of a mass of sediment across the floor, probably triggered by a 'seismic event' related to movement of the glacier or to calving at the floating tongue, created a recumbent fold in laminated sand and silt, but transfer of sediment over the lake bed was rare once it had been deposited. Varves are not common at Austerdalsisen, indicating that water temperature, lake chemistry, or variations of water and sediment discharge from the glacier were unfavorable for their formation; rhythmic deposition from density flows of sediments carried from beneath the glacier rarely occurred within the Austerdalsisen basin. (Humphreys-ISWS)
W77-04005

INTENSITY OF RAINFALL IN CLERMONE-FERRAND, (IN FRENCH),
For primary bibliographic entry see Field 2B.
W77-04032

MOLECULAR TEST FOR OIL POLLUTION IN SURFACE SEDIMENTS,
Strasbourg Univ. (France). Institut de Chimie.
For primary bibliographic entry see Field 5B.
W77-04058

2K. Chemical Processes

DYNAMICS OF INTERACTION OF CATIONS AND FULVIC ACID,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
C. H. Langford, and D. S. Gamble.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-37-II-39, 13 ref.

Descriptors: Chemistry, *Cation adsorption, Chemical reactions, Ions, *Cations, *Fulvic acids, Polyelectrolytes.
Identifiers: Aqueous transport(Metal ions), *Metal ions.

The aqueous transport of metal ions as it involves the related soluble fulvic acid complexes is discussed. For the experiment the metal ion used is Fe(3+) and the fulvic acid is a polyelectrolyte of a molecular weight of approximately 900 with approximately 3 m eq of phenolic sites ortho to carboxyl groups per gram. Results indicated that the rate of fulvic acid binding of Fe(3+) is similar to that for the simple ligand, sulfosalicylic acid. (See also W77-03642) (Chilton-ORNL)
W77-03662

ANALYTIC EQUATION OF STATE FOR SEA WATER,
Scripps Institution of Oceanography, San Diego, Calif. Marine Physical Lab.
For primary bibliographic entry see Field 1B.
W77-03770

SEASONAL VARIATIONS OF CHEMICAL CONSTITUENTS IN ANNUAL LAYERS OF GREENLAND DEEP ICE DEPOSITS,
State Univ. of New York at Buffalo. Dept. of Earth Sciences.
For primary bibliographic entry see Field 2C.
W77-03773

SIMULTANEOUS DETERMINATION OF TOTAL, NON-CARBONATE AND CARBONATE WATER HARDNESS BY DIRECT POTENTIOMETRY,
Canada Centre for Insland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-03780

DETERMINATION OF ARSENIC, TUNGSTEN, AND ANTIMONY IN NATURAL WATERS BY NEUTRON ACTIVATION AND INORGANIC ION EXCHANGE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.

W77-03788

GROUND-WATER RESOURCES OF THE HOLLOMAN AIR FORCE BASE WELL-FIELD AREA, 1967, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03878

DISTRIBUTION AND TREND OF NITRATE, CHLORIDE, AND TOTAL SOLIDS IN WATER IN THE MAGOTHY AQUIFER IN SOUTHEAST NASSAU COUNTY, NEW YORK, FROM THE 1950'S THROUGH 1973,
Geological Survey, Mineola, N.Y. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03887

GROUND-WATER RESOURCES AND GEOLOGY OF JEFFERSON COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03889

GEOTHERMAL INVESTIGATIONS IN IDAHO, PART 4, ISOTOPIC AND GEOCHEMICAL ANALSES OF WATER FROM THE BRUNEAU-GRAND VIEW AND WEISER AREAS, SOUTHWEST IDAHO,
Geological Survey, Reston, Va.; and Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 1A.
W77-03896

EARTHQUAKE-RELATED CHANGE OF THE HYDROGEN ION CONCENTRATION (PH) IN GROUND WATERS,
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Seismologii.
G. A. Mavlyanov, S. E. Ergashev, and A. N. Sultankhodzhayev.
Soviet Hydrology, Selected Papers, No. 2, p 74, November 1975. 1 fig. Translated from Uzbekskiy Geologicheskiy Zhurnal, No. 1, p 3-4, 1975.

Descriptors: *Earthquakes, *Groundwater, *Hydrogen ion concentration, Aquifers, Foreign countries, Wells, Foreign research, Water wells, Geology, Earthquake engineering.
Identifiers: *USSR.

Station observations of the variation in the chemical composition of groundwaters in deep aquifers in the Tashkent artesian basin showed a change in pH in two wells during an earthquake. According to micro-seismic investigations, the earthquake epicenter was near the village of Abaybazar, west of Tashkent in Southern Kazakhstan. From analyses of the two wells, it was concluded that the pH in deep aquifers decreases sharply before an earthquake. After an earthquake, the pH rises sharply to a value above or equal to the initial value. The pre-earthquake background pH in deep aquifers decreases sharply as elastic stresses accumulate and change the existing alkaline medium. Thus, it was decided that the variations of the pH in the two observed wells are associated with the Abaybazar earthquake of February 9, 1971. The pH of groundwaters is one of their important characteristics, and its decrease testifies to a change in hydrogeochemical conditions. Further investigations will permit establishing more reliable relations between the variations in pH and seismotectonic activity of the region. (Sims-ISWS)
W77-03990

COAL PILE LEACHATE - QUANTITY AND QUALITY CHARACTERISTICS,
Pickard and Anderson, Auburn, N.Y.
For primary bibliographic entry see Field 5B.
W77-03992

2L. Estuaries

THE ROLE OF FLOCCULATION IN THE TRANSPORT OF PARTICULATE POLLUTANTS IN THE MARINE ENVIRONMENT,
Bedford Inst., of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5B.
W77-03646

GEOCHEMICAL INTERACTION IN THE RECENTLY INDUSTRIALIZED STRAIT OF CANSO,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Geoscience Center; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
For primary bibliographic entry see Field 5B.
W77-03649

TRACE METAL POLLUTION FROM A METROPOLITAN AREA: SOURCES AND ACCUMULATION IN THE LOWER FRASER RIVER AND ESTUARY,
British Columbia Univ., Vancouver. Westwater Research Centre.
For primary bibliographic entry see Field 5B.
W77-03652

CHLORINATED HYDROCARBONS IN COASTAL MARINE ECOSYSTEMS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W77-03661

THE ROLE OF TIN IN BACTERIAL METHYLATION OF MERCURY,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03668

BACTERIAL MOBILIZATION OF MERCURY IN CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-03670

MATHEMATICAL MODELING OF ESTUARIAL ECOSYSTEMS,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03682

LEGAL SYMPOSIUM ON WETLANDS: AN EXECUTIVE SUMMARY, NOVEMBER 1974,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 6E.
W77-03685

THE CALIFORNIA COASTAL PLAN (A SYMPOSIUM).
For primary bibliographic entry see Field 6E.
W77-03688

OWNERSHIP OF SUBMERGED LANDS IN FLORIDA,
Miami Univ., Coral Gables, Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03695

LEGAL PROTECTION FOR FLORIDA WETLANDS,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03696

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN ESCAMBIA AND SANTA ROSA COUNTIES, FLORIDA ('ESCAROSA'),
Miami Univ., Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03697

COASTAL ZONE MANAGEMENT IN FLORIDA,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03699

A MATHEMATICAL MODEL FOR WATER QUALITY EVALUATION IN THE SOUTH CAROLINA GRAND STAND,
Clemson Univ., Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03731

A NUMERICAL INVESTIGATION OF THE CIRCULATION IN THE NORWEGIAN SEA,
Kingston Polytechnic, Kingston upon Thames (England). School of Mathematics.
A. Creegan.
Tellus, Vol. 28, No. 5, p 451-459, 1976. 11 fig, 9 ref.

Descriptors: *Oceans, *Water circulation, *Model studies, Foreign countries, Circulation, Ocean circulation, Movement, Numerical analysis, Finite element analysis, Approximation method, Equations, Topography, Analytical techniques, Winds, Stress.
Identifiers: *Norwegian Sea, Wind effects, Two layer model.

A numerical model of the Norwegian Sea was developed with the vertical structure modeled by two moving layers. Both the coastline and topography were represented by the finite difference formulation. From such data as is readily available, a preliminary study was made of the relative effects of topography, wind-driving, and interaction with the surrounding sea areas in determining the large-scale circulation of the Norwegian Sea. The following conclusions about the relative importance of the driving forces based on the results of this model were proposed: The observed circulation is difficult to explain in a wholly wind-driven flow; absence or reversal of the main currents is not observed, although clearly such a situation could well occur if anticyclonic stresses occurred for more than a few weeks. The average effect of the wind is to produce a general cyclonic circulation within the Norwegian Sea. For any given stress distribution, the topography serves to split the resultant circulation into two gyres, with that in the Norwegian Basin being the more pronounced. Inflow effects cannot be neglected when considering driving mechanisms. To progress further, more accurate modeling is required, particularly with regard to the details of the exchange with the Atlantic and inclusion of the East Greenland Polar Current. There is a clear implication that the effect of inflow is to establish a more permanent current system than could be expected from the wind stress alone. (Humphreys-ISWS)
W77-03750

MASS AND SALT TRANSFERS AND HALOCLINE DEPTHS IN AN ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences; and Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
R. R. Long.

Tellus, Vol. 28, No. 5, p 460-472, 1976. 16 fig, 28 ref. ONR N00014-75-C-0805. Code N66019.

Descriptors: *Estuaries, *Mathematical studies, *Mixing, *Stratification, Inflows, Inlets(Waterways), Saline water, Brackish water, Analytical techniques, Mass transfer, Equations, Freshwater, Outlets, Depth, Theoretical analysis, Saline water intrusion.
Identifiers: *Halocline, *Baltic Sea, *British Columbia.

Fluxes of brackish and ocean water out of and into an estuary as well as the depth of the halocline in the estuary were discussed in this paper. The discussion ignored the details of the mass distribution and circulations in the main body of the estuary (except for the halocline depth) and concentrated on determining the flow conditions and interface depths in the vicinity of the mouth. The flow there was considered to be frictionless and the pressure hydrostatic. The first part of the analysis, which assumed strong mixing (and, therefore, a deep halocline) in the estuary, yielded the same results as those of Stommel and Farmer for their 'overmixed' state. Phenomena in this state were determined by a non-dimensional number, Q, proportional to the freshwater influx, q sub f. The problem can also be solved when the mixing is zero. The two extreme cases suggest a dependence on a mixing number, M, for arbitrary mixing. This permits a complete solution for the ocean water flux, brackish water flux, depth of the interface at the mouth, salinity of the brackish water, depth of the halocline in the man body of the estuary, and height above sea level of the free surface in the estuary, all as functions of q sub f and M. An interesting feature of all solutions is the main halocline depth which always becomes large for both weak and strong freshwater fluxes, and, therefore, has a minimum at a value q sub fm which varies with M. This behavior has been observed in Alberni Inlet in British Columbia and in a laboratory experiment by Welander. Comparison of theory with the Baltic Sea led to some numerical results and speculations. (See also W75-02384) (Humphreys-ISWS)
W77-03751

MEAN CIRCULATION IN SHALLOW SEAS,
Woods Hole Oceanographic Institution, Mass.
G. T. Csanady.
Journal of Geophysical Research, Vol. 81, No. 30, p 5389-5399, October 20, 1976. 3 fig, 3 tab, 15 ref.

Descriptors: *Model studies, *Ocean circulation, *Atlantic Ocean, Mathematical models, Circulation, Water circulation, Salinity, Salts, Winds, Tides, Rivers, Continental shelf, Stress, Physical properties, Boundary layers, Oceanography.
Identifiers: *Shallow seas, Salt transport.

The mean circulation of shallow seas arises as the residue of chaotic first-order flow episodes created by winds, tides, and river inflow. The average effect of many such episodes is to generate an internal pressure and shear stress distribution which may differ significantly from a steady solution of the equations of motion. Within the coastal boundary layer (of about 10-km width), complex average effects of variable flow probably dominate. However, research reported in this paper has shown that in mid-shelf regions of the Mid-Atlantic Bight, for example, classical steady state models adequately describe the main features of the mean circulation. The statistical effects of variable first-order flow even bring about some simplifications of the theory, i.e., linear internal and bottom friction laws and a decoupling of salt transport from the mean circulation. The mid-shelf circulation of the Mid-Atlantic Bight was thus found to consist of four additive components, each driven by offshore wind, longshore pressure gradient, and density contrasts caused by freshwater influx. The longshore pressure gradient enters the theory as a parameter necessary for describing the interaction of a portion of the continental shelf with the rest of the ocean. The pressure gradient driven flow component is responsible for some notable circulation features such as the line of divergence in bottom drift at about the 60-m isobath. The wind-driven and thermohaline flow components are familiar in character. Quantitatively, the four components together account satisfactorily for the observed mean shelf circulation. (Sims-ISWS)
W77-03753

NEARSHORE CURRENTS OFF LONG ISLAND,
Brookhaven National Lab., Upton, N. Y.
J. T. Scott, and G. T. Csanady.
Journal of Geophysical Research, Vol. 81, No. 30, p 5401-5409, October 20, 1976. 9 fig, 2 tab, 13 ref.

Descriptors: *Ocean currents, *Boundary layers, *Atlantic Ocean, Currents(Water), Tides, Winds, Temperature, Water temperature, Salinity, Density, On-site investigations, Coasts, Shores, Circulation, Water circulation, Oceans, Oceanography, *New York.
Identifiers: *Long Island(NY).

Currents were observed at three levels, using electromagnetic current meters, for a 25-day period in September 1975 at 11 km south of Long Island where the water is 32 m deep. Tidal currents were found to be moderately strong, of the order of 20 cm/s. Nontidal flow is caused by wind stress, horizontal density contrasts due to freshwater influx, and a longshore surface level gradient sloping down southwestward. The time-averaged flow has simple characteristics which are adequately described by classical Ekman models in frictional equilibrium. By suitable changes in the averaging period, quantitative estimates of a bottom friction coefficient and a longshore pressure gradient were deduced from the data. The bottom friction coefficient agrees with what one would estimate from boundary layer theory for roughness elements of about 70-cm height. The longshore pressure gradient deduced from the behavior of currents agrees with the evidence of geodetic leveling. (Sims-ISWS)
W77-03754

AN HISTORICAL SKETCH OF PHYSICAL OCEANOGRAPHY IN CANADA,
Fisheries and Marine Service, Ottawa (Ontario).
N. J. Campbell.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2155-2167, October 1976. 36 ref.

Descriptors: *History, *Oceanography, *Canada, Surveys, Organizations, Universities, Ships, Scientific personnel, Research facilities, Fisheries, Marine biology, Sea ice, Oceans, Limnology.
Identifiers: *Physical oceanography.

The history of Canadian oceanography was outlined through the contributions of individual scientists and the organizations or programs they were associated with from 1890 to the early 1970's. The period up to 1960 reflects not only the scientific and personal efforts of H. B. Hachey, J. P. Tully, W. M. Cameron, and G. L. Pickard, but also their work in establishing oceanography as a science in Canada. The organizational developments which took place in the 1960's and their culmination in the building of the Bedford Institute of Oceanography, the Canada Centre for Inland Waters, and the Institute of Ocean Sciences now under construction on the west coast were described. (Sims-ISWS)
W77-03759

EVIDENCE OF A WESTWARD-FLOWING 'SUBARCTIC COUNTERCURRENT' IN THE NORTH PACIFIC OCEAN,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
S. Tabata.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2168-2196, October 1976. 18 fig, 1 tab, 42 ref.

Descriptors: *Ocean circulation, *Pacific Ocean, *Subarctic, *Ocean currents, Monthly, Surfaces, *Currents(Water), Water transfer, Winds, On-site investigations, Ships, Oceanography.
Identifiers: North Pacific Ocean, Ekman transport.

An examination of surface current velocity data obtained from two independent ship sources suggested the presence of a narrow, weak, westward-flowing countercurrent at a latitude of approximately 50 deg N in the subarctic Pacific region. Oceanographic survey data collected in the region from the summers of 1958 and 1959 also indicate such a countercurrent extending zonally for more than 1000 km. The countercurrent can be explained by consideration of the wind-stress vorticity field over the region. (Sims-ISWS)
W77-03760

A RECONNAISSANCE OF THE RECENT SEDIMENTS OF THE RANNS OF KUTCH, INDIA,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
K. W. Glennie, and G. Evans.
Sedimentology, Vol 23, No 5, p 625-647, October 1976. 11 fig, 1 tab, 22 ref.

Descriptors: *Surveys, *Sediments, *Tidal effects, *On-site investigations, Mud flats, Sampling, Cores, Core logging, Estuaries, Intertidal areas, Evaluation, Water analysis, Rivers, On-site data collections, Mineralogy, Foreign countries.
Identifiers: *India, *Kutch(India), Mineral analysis.

The Ranns of Kutch are flat, salt-covered desert areas (sabkhas) which are just above the normal tidal range and may be regarded as supratidal flats. They are flooded annually by the storm tides of the Southwest Monsoon. As the waters recede and evaporate, they leave behind a crust of halite, and gypsum crystals grow within the clays and sands. The increase in salinity of the interstitial waters as they are traced inland is reflected in the higher boron content of the clays. The Mg(2+)/Ca (2+) ratio of these waters increases from 3 on the coast to 240 in the evaporite environment of the shoreline of Pachham Island. Much of the sediment of the Ranns was probably once derived from the Indus and Nara rivers which used to flow into the western end of the Great Rann. Clay is now probably carried in by the monsoon storm tides after being transported along shore from the Indus and also from the rivers of Kutch and Kathiawar. Coarser siliciclastic sediment is carried into the eastern inland portion of the area by the Luni and other intermittently flowing rivers and streams. Some sand and silt is blown into the Ranns from the surrounding hilly areas. Foraminifera are found concentrated in the sandier fractions of the sediments, having been transported there primarily by tidal currents and also by the wind. One species of Ammonia is almost the only fauna found in the sediments of the very saline environment around Pachham Island. (Humphreys-ISWS)
W77-03762

SOME REMARKS ON THE MAINTENANCE OF THE SALINITY DISTRIBUTION IN ESTUARIES,
Liverpool Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
P. C. Chatwin.
Estuarine and Coastal Marine Science, Vol 4, No 5, p 555-566, September 1976. 4 fig, 1 tab, 17 ref.

Descriptors: *Salinity, *Estuaries, Mathematical studies, *Water circulation, *Model studies, Physical properties, Circulation, Estuarine environment, Gulfs, Mathematics, Mathematical

models, Saline water, Numerical analysis, Sea water, Water quality, Equations, Salt balance, Distribution.
Identifiers: *Salinity distribution, Model equations, *Estuarine circulation, *Salinity gradients, *Salinity variation, Model estuary, Vertical diffusion, Longitudinal advection, Tidal period.

A set of model equations describing the time-averaged velocity and salinity in an estuary was discussed and used to obtain expressions for the longitudinal and vertical components of velocity and for the salinity distribution. The theory was shown to be self-consistent in the central part of the estuary and to be in agreement with observations reported by Harleman and Ippen (1967). Finally, it was argued that theoretical treatments of this problem which use a steady one-dimensional diffusion equation to describe the longitudinal salinity distribution are physically unrealistic. (Henley-ISWS)
W77-03764

NUMERICAL MODELS FOR THE PREDICTION OF WAVE SET-UP AND NEARSHORE CIRCULATION,
Delaware Univ., Newark. Dept. of Civil Engineering.
W. A. Birkemeier, and R. A. Dalrymple.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A022 694, Price codes: A07 in paper copy, A01 in microfiche. Technical Report No. 1, January 1976. 136 p, 28 fig, 35 ref, 2 append. ONR N0014-76-C-0342.

Descriptors: *Model studies, *Waves(Water), *Water circulation, Mathematical models, *Ocean waves, Beaches, Mathematical studies, Coasts, Equations, Shores, Circulation, Currents(Water), Finite element analysis, Estuaries.
Identifiers: Wave set-up, Rip currents, *Nearshore circulation.

An explicit finite difference model for predicting time-dependent, wave-induced nearshore circulation was discussed. The formulation included wave refraction, wave-current interaction, an anisotropic bottom friction, wave set-up, wind effects, and coastal flooding. In addition to the explicit scheme, a one-dimensional implicit scheme was developed to determine the importance of the convective acceleration terms in the equation of motion. Results were shown for the following three cases: (1) set-up in a wave channel due to steady waves and wave groups, (2) circulation in a rectangular wave tank under oblique wave attack, and (3) wave and wind induced circulation on a longshore periodic beach. In all three cases, comparison with experimental data was made. Important results were as follows: tuned wave groups can incite seiching in an enclosed basin and harbor, and rip currents will be induced or maintained by the presence of surf zone channels. (Sims-ISWS)
W77-03769

THE CEPHALOPODA. PART I: OEGOPSIDA; PART II: MYOPSIDA, OCTOPODA,
C. Chun.
Available from the National Technical Information Service, Springfield, VA 22161 as TT69-55057/1 and 2, Price codes: E10 in paper copy, A01 in microfiche. Verlag Von Gustav Fischer, Jena, 1910. Text, 436 p. 95 plates, 184 ref; Atlas, 264 p. 95 plates. Translation of Vol. 18, Scientific Results of the German Deepsea Expedition on Board of the Steamship 'Valdivia', 1898-1899.

Descriptors: *Marine animals, *Mollusks, *Classification(Biological), Systematics, Varieties, Oceans, Speciation, Taxonomy.
Identifiers: *Cephalopoda, *Oegopsida, *Myopsida, *Octopoda, *Squids, Octopuses.

The text of this two-part 18th volume presents the results of the German 1898-1899 deepsea expedition on board the SS 'Valdivia' conducted under the auspices of the German Ministry of the Interior. It was translated from the German by the Israel Program for Scientific Translations in 1975 and describes the anatomy of nine families of Oegopsida libera, one family of Oegopsida consuta, three families of Myopsida, and seven families of Octopoda, including larval, juvenile and adult stages. Details are given of external characteristics, such as head, funnel apparatus, mantle, arm apparatus, and hectocotylization of some species. The internal organization is defined by nervous systems, intestinal tracts, vascular systems, excretory systems, body cavity, genitalia, and luminous organs. The narration is supplemented by illustrations. A separately bound companion atlas consists of 95 plates, in color and black-and-white, of the morphology of the various species. (Auen-Wisconsin)
W77-03776

EFFECTS OF OIL ON THE AMPHIPOD GAMMARUS OCEANICUS,
Swedish Water and Air Pollution Research Lab., Nykoping. Baltic Sea Lab.
For primary bibliographic entry see Field 5C.
W77-03777

PRIMARY PRODUCTIVITY OF THE BENTHIC MICROALGAE IN THE CHURCHI SEA NEAR BARROW, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W77-03782

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5A.
W77-03785

DISTRIBUTION OF LOW-MOLECULAR-WEIGHT HYDROCARBONS IN SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
For primary bibliographic entry see Field 5B.
W77-03793

EFFECTS OF PULP MILL EFFLUENT ON PHYTOPLANKTON PRODUCTION IN COASTAL MARINE WATERS OF BRITISH COLUMBIA,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-03797

MARINE PHYTOPLANKTON GROWTH IN HIGH CONCENTRATIONS OF PULP MILL EFFLUENT,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-03798

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W77-03826

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03831

MEASUREMENTS OF A SMALL NEAR-BOTTOM CYCLONIC CIRCULATION NEAR THE GULF STREAM AXIS,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
R. A. Clarke.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2197-2202, October 1976. 7 fig, 4 ref.

Descriptors: *Ocean circulation, *Ocean currents, *Atlantic Ocean, Circulation, Water circulation, Currents(Water), Density, On-site investigations, Current meters, Bathymetry, Oceanography, Measurement.
Identifiers: *Gulf Stream, Cyclonic circulation.

Data from near-bottom current meters moored in a small triangular array (25 km/side), plus hydrographic sections, revealed the presence of a near-bottom cyclonic circulation with a radius of 50 km and velocity of 10 cm/s just north of the Gulf Stream near 50 W. The circulation extends to at least 1350 m from the ocean floor and was observed over a period of 9 days during which time it moved southward toward the Stream with speeds of 0.5-15 cm/s. The strength of the circulation decreases somewhat with distance from the bottom. (Sims-ISWS)
W77-03842

SPECTRAL ANALYSIS OF THE LONG-TERM OCEANOGRAPHIC TIME SERIES AT OCEAN WEATHER STATION 'P',
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
C. K. Ross, and G. T. Needler.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2203-2212, October 1976. 9 fig, 2 tab, 11 ref, 2 append.

Descriptors: *Time series analysis, *Water temperature, *Density, *Pacific Ocean, Analytical techniques, On-site investigations, On-site data collections, Data processing, Ships, Frequency analysis, Oceanography.
Identifiers: *Ocean weather stations, Ocean Station P, Weatherships, Spectral analysis, Spectral estimates, Missing data.

Oceanographic observations taken at Ocean Station 'P' (50 N, 145 W) provide one of the few long oceanographic time series. The intermittent nature of the sampling program at Station 'P', however, presents problems for a standard time-series analysis. In this paper, the seriousness of this aspect of the data was discussed, and spectral estimates were obtained for the potential temperature, potential density anomaly, and dynamic height anomaly at several depths. It was found that the lowest frequency estimates of dynamic height anomaly are approximately an order of magnitude less than those obtained from a similar station in the North Atlantic. This is consistent with a more rapid falloff of energy with depth at Station 'P'. (Sims-ISWS)
W77-03843

A STUDY IN THE SLOPE WATER REGION SOUTH OF HALIFAX,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
M. G. Gatien.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2213-2217, October 1976. 6 fig, 1 tab, 6 ref.

Descriptors: *Water temperature, *Density, *Continental slope, *Atlantic Ocean, On-site investigations, Data processing, Temperature, Salinity, Currents(Water), Ocean currents, Circulation, Ocean circulation, Oceanography, Canada.
Identifiers: *Slope water, *Gulf Stream, *Labrador current.

Based on a reanalysis of the data from the Gulf Stream 1960 survey, it was proposed that the Slope Water is comprised of two distinct zones. The first, warm Slope Water, is a well-mixed zone found between 0 and 400 m depth close to the Gulf Stream; the flow is primarily eastward. The second zone, Labrador Slope Water, is deeper, clings to the continental slope below 100 m, and is broadest near sigma sub t = 27.5; it is poorly mixed and flows to the west. The boundary between the two zones varies in shape and intensity in response to changes in the Gulf Stream and the Labrador Current. Observations made in the Slope Water region south of Halifax in November 1973 were discussed in terms of the two Slope Water zones. In particular, movements of the boundary between the two zones were examined. (Sims-ISWS)
W77-03844

SUBSURFACE CURRENTS IN THE STRAIT OF GEORGIA, WEST OF STURGEON BANK,
British Columbia Univ., Vancouver. Inst. of Oceanography.
P. Chang, S. Pond, and S. Tabata.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2218-2241, October 1976. 18 fig, 3 tab, 34 ref.

Descriptors: *Currents(Water), *Subsurface flow, *Estuaries, Tides, Tidal waters, Temperature, Water temperature, Frequency analysis, Time series analysis, Coasts, Circulation, Water circulation, On-site investigations, Canada.
Identifiers: *Strait of Georgia(Canada), *British Columbia, *Spectral analysis, Tidal currents.

Spectral characteristics of subsurface currents and temperature records spanning 310-533 days from the Strait of Georgia near Sturgeon Bank were examined. Of particular interest are low-frequency fluctuations having a characteristic period of 30 days. Typically, the energy of the low-frequency and tidal currents are equal at 50 m (each about 40% of the total) and 10 and 70%, respectively, at 200 m. Low-frequency currents are observed to be baroclinic and possess a lateral length scale less than 10 km. Their generation mechanisms are not identified. Low-frequency fluctuations in sea level and current have poor-to-fair coherence, while fluctuations in air pressure and current have poor coherence. Low-frequency fluctuations in wind and current have fair coherence at the eastern mooring and poor coherence at the remaining two moorings. Fluctuations in water temperature have a characteristic period of 300 days. Water temperatures at different locations generally have poor coherence except at the lowest frequencies where they are fair to good. Water temperature and current at the same location have poor coherence. Tidal currents are found to be ellipses, with the large constituents being M sub 2 and K sub 1. The magnitude, shape, and orientation of the tidal current ellipses ar time-dependent. Internal tides were suggested as an explanation. (Sims-ISWS)
W77-03845

TIDAL CURRENTS AND ESTUARINE-TYPE CIRCULATION IN JOHNSTONE STRAIT, BRITISH COLUMBIA,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
R. E. Thomson.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2242-2264, October 1976. 16 fig, 1 tab, 12 ref.

Descriptors: *Currents(Water), *Estuaries, *Tides, Tidal waters, Current meters, Frequency analysis, Salinity, Density, Temperature, Water temperature, Dissolved oxygen, Circulation, Water circulation, Winds, On-site investigations, Data processing, Analytical techniques, Canada.
Identifiers: *Johnstone Strait(Canada), *British Columbia, Tidal currents.

Four months of current meter observations across the western basin of Johnstone Strait have been examined, with particular attention given to the mean flow and to variations at tidal frequencies. It was shown that the time-averaged motions are typical of a moderately stratified estuary driven by tidal mixing and nonlinear advection. Steady currents are nearly unidirectional at all depths, with the net outflow in the upper layer essentially balanced by a net inflow in the lower layer to order 1000 cu m/s. In addition, the relatively small variation in residual current speed is found to decrease with depth and to be associated mostly with the quasi-fortnightly tidal cycle. Near the surface, the variance in the residual flow appears to be related to along-channel winds whose speeds and duration exceed 6 m/s and 24 h, respectively. Time-dependent motions are dominated by the tidal signal, which is mixed and predominately semidiurnal. Maximum speeds of order 1 m/s are found at depth and are generally 1.5-1.7 times larger than in the upper layer. There is also a strong correlation between the tidal current speeds below 150-m depth, and the local tide height lagged by 6 h. It was suggested that these larger lower layer currents are associated with baroclinic motions being generated by the barotropic tide propagating over the rapidly shoaling bathymetry to the east of the observation region. (Sims-ISWS)
W77-03846

MEASUREMENTS OF WAVES IN SOUTHAMPTON WATER AND THEIR VARIATION WITH THE VELOCITY OF THE TIDAL CURRENT,
University of East Anglia, Norwich (England). School of Environmental Sciences.
C. E. Vincent, and D. J. Smith.
Estuarine and Coastal Marine Science, Vol. 4, No. 6, p 641-652, November 1976. 5 fig, 12 ref.

Descriptors: *Waves(Water), *Estuaries, *On-site investigations, *Tidal waters, Currents(Water), Analytical techniques, Measurement, Evaluation, Mathematical models, Equations, Energy, Tides, On-site data collections, Numerical analysis.
Identifiers: *Southampton water(England).

Measurements of waves and currents at one location in Southampton Water showed considerable increase in the wave energy when the tide begins to ebb. Some of the theoretical changes in the form of wind-generated waves in estuaries can be described using non-time varying currents. With the addition of time variation, it was shown that numerical techniques offer a useful method for determining theoretically the changes in the wave energy and wave number of waves interacting with tidal currents. The trends in the variation of wave energy with current speed of the observed data and the numerical model were shown to be in broad agreement, but the considerable variability between consecutive spectra of the Southampton Water data require further explanation. It was suggested that the variability between the wave spectra is probably a result of the combination of the kinematic effects of trapping and focussing in the current shear, while the general trend of increasing wave energy with increasing counter current is a dynamic effect of wave-current interaction. (Humphreys-ISWS)
W77-03856

ACCUMULATION AND DISTRIBUTION OF TOTAL MERCURY IN ESTUARINE SEDIMENTS,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia). Atlantic Geoscience Centre; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
For primary bibliographic entry see Field 5B.
W77-03857

THE EFFECTS OF FRESHWATER INFLOWS ON HYDROLOGICAL AND BIOLOGICAL PARAMETERS IN THE SAN ANTONIO BAY SYSTEM, TEXAS,
Texas Parks and Wildlife Dept., Austin. Coastal Fisheries Branch.
R. Childress, E. Bradley, E. Hagen, and S. Williamson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-246 905, Price codes: A10 in paper copy, A01 in microfiche. Report on Project No. 2-160-R, August 1975. 205 p, 71 fig, 29 tab, 58 ref.

Descriptors: *Texas, *Bays, *Estuaries, *Freshwater, *Hydrologic data, *Meteorological data, *Biological communities, Rainfall, Nutrients, Phosphorus, Nitrogen, Currents(Water), Fish, Shellfish.
Identifiers: *San Antonio Bay(Tex).

Semi-monthly samples of biologic, water quality, and meteorologic parameters were taken at various stations in the San Antonio Bay system of Texas. Hydrographic parameters concerning current movements were measured at selected intervals. The biological data and historical commercial fish and shellfish landings statistics were subjected to computerized analysis for possible correlations with simple and cumulative lag river inflow to the estuary and various hydrologic parameters. These analyses were performed in an effort to determine the importance of freshwater inflows, their effect on estuarine biota, and the quantity and quality of fresh water required by the system. Based on information obtained from this project, riverflow appears to be the major source of fresh water and nutrients of the San Antonio Bay system. The ecology of the plants and animals which presently constitute the biologic community is controlled mainly by the interaction between the river inflow from the upper bay and saltwater intrusion from the lower portions of San Antonio Bay. Many of the fish and shellfish respond markedly to changes in the amount and timing of freshwater inflows. It can be inferred that any major deviation in the annual amount or timing of freshwater inflows from the historic average range will cause a major alteration in the ecology of the system. (Sinha-OEIS)
W77-03897

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT. SPECIAL REPORT I: WATER QUALITY MODELLING AND MANAGEMENT STUDIES FOR CORPUS CHRISTI BAY: A LARGE SYSTEM APPROACH,
Texas Univ., at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 5B.
W77-03898

EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS ON ESTUARINE ORGANISMS - PHASE II,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W77-03901

COASTAL MARINE POLLUTION AND FISH,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-03902

PHOTOGRAMMETRIC EXPERIMENTS ON NEARSHORE MIXING AND DIFFUSION,
Coastal Engineering Research Center, Fort Belvoir, Va.
P. G. Teleki, and D. A. Prins.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A014 216, Price codes: A02 in paper copy, A01 in microfiche. U.S. Army Coastal Engineering Research Center Reprint No. R9-74. Reprint from the Proceedings of the Second International Conference on Port and Ocean Engineering under Arctic Conditions, (1974). 15 p, 13 fig, 1 tab, 17 ref.

Descriptors: *California, *Coastal structures, *Photogrammetry, *Diffusion, *Mixing, *Baseline studies, *Environmental effects, *Water resources, Circulation, Coastal engineering, Analytical techniques.
Identifiers: *Outer Continental Shelf, Coastal zone, Nearshore environment, Marine environment, Offshore structures.

Aerial multispectral photography and fixed point metering were used in the study of coastal currents at two sites in California. The system combining current meters, low-altitude photography and photodensitometric analysis of the suspended matter or tracer dyes is well suited to the study of both advective and diffusive processes in the ocean. Experiments were carried out in the vicinity of marine structures for the purpose of understanding their influence on coastal circulation. (Sinha-OEIS)
W77-03907

MEASUREMENT OF VOLATILE AND NON-VOLATILE HYDROCARBONS IN SELECTED AREAS OF THE ATLANTIC OCEAN,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
For primary bibliographic entry see Field 5A.
W77-03911

STERIC CONTRIBUTION TO THE SEASONAL OSCILLATION OF SEA LEVEL OFF OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
B. A. Brunson, and W. P. Elliott.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A009 601, Price codes: A02 in paper copy, A01 in microfiche. Reprint from Journal of Physical Oceanography, Vol 4, No 3, p 304-309, July 1974. 5 fig, 1 tab, 9 ref.

Descriptors: *Oregon, *Sea level, *Upwelling, *Baseline studies, *Environmental effects, Water resources, Salinity, Temperature, Ocean currents, Weather patterns, *Columbia River, Seasonal.
Identifiers: *Outer Continental Shelf, *Seasonal variations, *Isostatic variations, *Wind stress, Coastal zone, Oceanographic conditions.

Thermal, haline and total steric departures of sea level were calculated in a zone up to 165 n mi off Newport, Oregon. The thermal and haline components were about equal in magnitudes and in phase, giving low steric sea levels nearshore and high sea levels offshore in summer and the reverse pattern in winter. These results are produced by local oceanographic conditions and reflect seasonal changes in upwelling and the position of the Columbia River plume. In the region close to shore the combined effects of steric and atmospheric-pressure-caused departures do not fully account for the observed variations of sea level. Wind stress variations are likely to be the most important cause but other factors may well contribute. (Sinha-OEIS)
W77-03912

MARSH GAS FROM THE ATLANTIC COASTAL PLAIN,
Delaware Univ., Newark. Coll. of Marine Studies.
F. M. Swain.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A010 236, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 35, March 1975. 21 p, 11 fig, 5 tab, 1 ref. ONR-N00014-69-A0407.

Descriptors: *Delaware, *Methane, *Marsh plants, *Aquatic plants, Resource development, *Baseline studies, Environment, Tidal marshes, *Tidal effects, Mangrove swamps, Freshwater, Pollutant identification.
Identifiers: U.S. East Coast, Coastal zone, *Marsh gas, Turtle grass, *Atlantic coastal plains.

Flows of marsh gas were measured at upland, freshwater marsh, and tidal marsh localities in Delaware in 1971 and 1972, and at a few other localities along the Atlantic coast in the early part of 1973. The gases, mainly methane, were collected in gas-tight flasks, and were analyzed by gas chromatography and mass spectrometry. Other gases detected include principally carbon dioxide, ammonia, ethylene, and hydrogen sulfide. At the localities in Delaware the flows were consistently greater in freshwater and upstream parts of tidal marshes than in the more seaward parts of the marshes where effects of tidal flushing are greater. Increased flows following rainstorms and decreased flows during prolonged dry spells were typical. At scattered localities in North Carolina, Georgia and Florida the higher flows of marsh gas were found in freshwater marshes having moderately negative Eh values, whereas low gas flows wer obtained from coastal mangrove and turtle grass environments or from freshwater acidic marshes with weakly negative Eh values. Cultures of a variety of marsh plants and bacterial mud show marked variations in methane evolution according to the species of plant. (Sinha-OEIS)
W77-03913

EFFECTS OF WASTE WATER ON ESTUARINE ECOSYSTEMS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
For primary bibliographic entry see Field 5C.
W77-03914

ALTERNATIONS OF FLOW CHARACTERISTICS WITHIN GEOTHERMAL AREAS BY TIDAL FORCES,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
J. S. Rinehart.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 190, Price codes: A02 in paper copy, A01 in microfiche. National Science Foundation (RANN) Report No. NSF-FA-N-75-127, June 1975. 15 p, 5 ref. AER74-03429.

Descriptors: *Geothermal studies, *Tidal effects, *Flow characteristics, *Groundwater, *Heated water, *Pore pressure, Water resources, Earth pressure, Heat flow.

The state of strain within the earth is undergoing constant temporal and spatial changes that modify permeabilities and pore pressures, the regulators of the flow of fluids through rock masses. Any change in the state of strain can be expected to influence flow. Some important sources of the stresses producing strains are tidal forces, thermal forces, alterations in mechanical structure, and chemical reactions. Effects of tidal forces are the easiest to analyze since they can be calculated precisely. It is shown in this paper how tidal forces will alter the flow characteristics of certain plausible models of geothermal systems. Although tidal stresses are only of the order of ten to the minus seven power to ten to the minus eight power, the longer period tides especially could produce large and significant dimensional changes in the separation of fracture surfaces and the size of flow channels, and could influence appreciably the distribution of pore pressure. (Sinha-OEIS)
W77-03915

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 1ST QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 2ND QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 3RD QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03919

APPLICATIONS OF ERTS IMAGERY AND SHIPBOARD OBSERVATIONS TO COASTAL ENVIRONMENTS STUDIES. PART I - HYPERSALINE ENVIRONMENTS, PART II - COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
D. S. Gorsline, S. P. Vonder Haar, and C. C. Davis.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 570, Price codes: A03 in paper copy, A01 in micrfiche. Final Technical Report No. USC-GEOL. - 76-1, August 1975. 40 p, 10 fig, 1 tab, 30 ref. ONR-N00014-67-A-0269-0009C.

Descriptors: *California, *Estuarine environment, *Circulation, *Salinity, *Flooding, *Sediment transport, *Baseline studies, *Environmental effects, Water resources, Evaporation, Humidity, Turbidity, Coasts, Satellites(Artificial), *Remote sensing.
Identifiers: Outer Continental Shelf, *Hypersaline environments, *Nearshore environments, *Coastal processes, ERTS imagery, LANDSAT imagery, Coastal zone.

Studies of the frequency of flooding and the duration of flooding effects on hypersaline coastal tidal and supra-tidal surface along the Baja California coast are reported. Studies show that the flooding is not necessarily seasonal but can have a period of over a year. Coincidence of onshore winds, spring tides and coastal topography are probably the main factors influencing the times of major flooding. Subsequent evaporation is at varying rates that reflect wuch factors as cloud cover and probably local changes in humidity and brine salinity. Dry surfaces are easily traversed by wheeled vehicles but even moderate wetting creates poor conditions of trafficability. Analysis of ERTS (LANDSAT) imagery off southern California is continuing. Preliminary examples of relationships between satellite imagery patterns and field observations from ships show a good regional correlation but details of the turbidity patterns are not as easily resolved from ship data due to the problem of travel time and station frequency. Ship data does serve to confirm satellite sensor data where stations and features coincide. (Sinha-OEIS)
W77-03921

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOL VI. IMPACT OF OFFSHORE TERMINALS ON CONTIGUOUS PORTS,
Harris (Frederic R.), Inc., New York.

For primary bibliographic entry see Field 5G.
W77-03923

PROCEEDINGS FOR SECOND ANNUAL CONFERENCE ON THE RESTORATION OF COASTAL VEGETATION IN FLORIDA.
Hillsborough Community Coll., Tampa, Fla.
For primary bibliographic entry see Field 5G.
W77-03942

KEYNOTE SPEECH, SECOND ANNUAL CONFERENCE ON RESTORATION OF COASTAL VEGETATION IN FLORIDA,
Environmental Protection Agency, Atlanta, Ga.
For primary bibliographic entry see Field 5G.
W77-03943

REVEGETATION OF THALASSIA TESTUDINUM IN A MULTIPLE-STRESSED ESTUARY, NORTH BISCAYNE BAY, FLORIDA,
Miami Univ., Fla. Dept. of Microbiology.
For primary bibliographic entry see Field 5G.
W77-03944

SEAGRASS REVEGETATION ATTEMPTS IN ESCAMBIA BAY, FLORIDA, DURING 1974,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
For primary bibliographic entry see Field 5G.
W77-03945

LOSS OF SUBMERGED VEGETATION IN THE PENSACOLA BAY SYSTEM,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
For primary bibliographic entry see Field 5G.
W77-03946

PATTERNS OF SECONDARY SUCCESSION IN A MANGROVE COMMUNITY, TAMPA BAY, FLORIDA,
East Stroudsburg State Coll., Pa. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03947

THE POSSIBLE ROLE OF SPARTINA ALTERNIFLORA LOISEL IN ESTABLISHMENT OF MANGROVES IN FLORIDA,
Hillsborough Community Coll., Tampa, Fla. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03948

EFFORTS IN MARINE REVEGETATION IN ARTIFICIAL HABITATS,
Marco Applied Marine Ecology Station, Marco Island, Fla.
For primary bibliographic entry see Field 5G.
W77-03949

ASPECTS OF RED MANGROVE REFORESTATION IN FLORIDA,
Florida Inst. of Tech., Jensen Beach. Environmental Studies.
For primary bibliographic entry see Field 5G.
W77-03950

PLANTINGS OF RED MANGROVE (RHIZOPHORA MANGLE L.) IN CHARLOTTE AND ST. LUCIE COUNTIES, FLORIDA,
Miami Univ., Coral Gables. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03952

LIGHTNESS AND COLOR OF THE SEA WATER IN THE TAGONOURA-PORT, (IN JAPANESE),
Tokai Univ., Shizouka (Japan). Faculty of Marine Science and Technology.
For primary bibliographic entry see Field 5A.
W77-03965

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 2E.
W77-03974

CONTROL OF FJORDIC DEEP WATER RENEWAL BY RUNOFF MODIFICATION,
Dunstaffnage Marine Research Lab., Oban (Scotland).
A. Edwards, and D. J. Edelsten.
Hydrological Sciences Bulletin, Vol 21, No 3, p 445-450, September 1976. 2 fig, 5 ref.

Descriptors: *Fjords, Control, *Model studies, Brackish water, Frequency, Rivers, Estuaries, Runoff, Control structures, Precipitation(Atmospheric), Deep water.
Identifiers: *Scotland, *Loch Etive(Scotland), Runoff records, Freshwater runoff, Renewal, Natural runoff pattern, Runoff modification, Fjordic deep water.

Loch Etive is a Scottish fjord subject to freshwater runoff which renders it markedly brackish. This paper considered the frequency of deep water renewal by developing a model which relates the timing of all such renewals to runoff records. Using the model, it is possible to examine the effect of changes caused by interference with the natural runoff pattern. The estuary-river system is very sensitive to changes in runoff pattern, but the magnitude and timing of man's interference has so far been sufficient only to increase the mean time between renewals by an insignificant amount. (Roberts-ISWS)
W77-03975

WIND AND THE SURFACE CIRCULATION OF A FJORD,
British Columbia Univ., Vancouver. Inst. of Oceanography.
J. R. Buckley, and S. Pond.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2265-2271, October 1976. 7 fig, 1 tab, 9 ref.

Descriptors: *Circulation, *Water circulation, *Fjords, *Canada, Buoys, Radar, Velocity, Winds, Rivers, Salinity, Tidal effects, Tidal waters, Tides, On-site investigations, Data processing.
Identifiers: *Howe Sound(British Columbia), *British Columbia.

An experiment was carried out recently to investigate the relative effects of wind, tide, and river runoff on the circulation of the surface layer of a small fjord. Drogues were tracked with a radar set for several days at four locations. Data were recorded photographically and digitized for computer processing to produce the velocity and acceleration of each drogue along its track. Wind forcing was dominant. The river input was important too, causing large horizontal shears in the flow. Tidal effects appeared to be negligible. Frictional coupling between the surface layer and the water below appeared to be very small. A mechanism for the surface layer behavior was proposed, with the layer nearly decoupled from the underlying water by a strong pycnocline. The basic assumptions of this mechanism applied to the data set yielded an average drag coefficient of 1 to 0.002. (Sims-ISWS)
W77-03976

A CANADIAN ARCTIC FJORD WITH SOME COMPARISONS TO FJORDS OF THE WESTERN AMERICAS,
Department of the Environment, Victoria (British Columbia). Frozen Sea Research Group, and Department of the Environment, Victoria (British Columbia). Ocean and Aquatic Affairs.
R. A. Lake, and E. R. Walker.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2272-2285, October 1976. 12 fig, 3 tab, 41 ref.

Descriptors: *Fjords, *Canada, *Arctic, Circulation, Water circulation, Ice, Sea ice, Glaciers, Rivers, Temperature, Salinity, Density, Physical properties, Meteorology, Winds, Discharge(Water), Tides, Tidal waters, Dissolved oxygen, Waves(Water), Internal waves, Estuaries, Oceanography.
Identifiers: *d'Iberville Fiord(Canada).

Aspects of oceanography of d'Iberville Fiord (80 deg 30 min N, 80 deg 00 min W) were compared to oceanography of west coast fjords of North and South America. Because of high latitude, hence cold temperature, d'Iberville Fiord is covered by sea ice for at least 11 mo of each year. An estuarine circulation flows under sea icec except for those Augusts in which sea ice clears. The sea ice cover and the small tides typical of the northwest Canadian arctic archipelago mean energy inputs to fjord waters are small, and currents are light. However, water structure in many respects is not dissimilar to that in fjords elsewhere. Effects of a large active glacier debouching into headwaters of d'Iberville Fiord were noted. (Sims-ISWS)
W77-03977

WATER, HEAT, AND SALT TRANSPORTS THROUGH NARES STRAIT, ELLESMERE ISLAND,
Defence Research Establishment Ottawa (Ontario).
H. E. Sadler.
Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2286-2295, October 1976. 7 fig, 2 tab, 29 ref.

Descriptors: *Water transfer, *Heat transfer, *Salts, *Arctic, *Canada, *Polar regions, Circulation, Water circulation, Oceans, Ocean circulation, Currents(Water), Mass transfer, Ice, Sea ice, Temperature, Salinity, Current meters, Oceanography.
Identifiers: *Nares Strait(Canada), *Ellesmere Island(Canada).

Data obtained in Nares Strait were used to provide estimates of the transports of water, heat, and salt between the polar ocean and northern Baffin Bay. The annual volume export of water through Nares Strait is 21,000 cu km plus or minus 30%, which is equivalent to a mean flow of 0.67 times 10 to the 6th power cu m/s and which is about 15% of the total outflow of water from the polar ocean. The annual net heat input into the polar ocean due to the outflow of cold water and ice was found to be 15 times 10 to the 19th power J plus or minus 50%, assuming a reference temperature of -0.1C. This volume is about 7% of the total advective heat transport into the polar ocean. The mean annual export of salt from the polar ocean is 6.7 times 10 to the 14th power kg plus or minus 30%, or about 6% of the total export. The total transports through the whole Canadian archipelago were estimated, and it was shown that they are appreciable fractions of the total exchanges between the polar ocean and the world ocean. (Sims-ISWS)
W77-03978

SPECTRUM OF SMALL-SCALE OCEANIC TEMPERATURE GRADIENTS,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
J. A. Elliott, and N. S. Oakey.

Journal of the Fisheries Research Board of Canada, Vol 33, No 10, p 2296-2306, October 1976. 8 fig, 2 tab, 15 ref.

Descriptors: *Oceans, *Temperature, *Atlantic Ocean, Time series analysis, On-site data collections, Instrumentation, Model studies, Data processing, Water temperature, Salinity, Thermocline, Analytical techniques, Oceanography.
Identifiers: *Microstructure spectra.

The spectrum of the vertical temperature gradient was computed for a number of 'typical' 50-m long profiles from the upper 200 m of the ocean. Most of the variance occurs in the microstructure range, between approximately 1 and 100 cycles/m; there is normally a spectral maximum near 10 cycles/m. The shape of the spectra for the range 10-100 cycles/m agrees well with that predicted for sharp interfaces that have been smoothed by thermal diffusion. (Sims-ISWS)
W77-03979

A METHOD FOR THE AUTOMATIC MEASUREMENT OF WAVE FREQUENCY,
Canada Centre for Inland Waters, Burlington (Ontario).
M. Donelan.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2318-2322, October 1976. 3 fig, 11 ref.

Descriptors: *Waves(Water), *Measurement, *Winds, Model studies, Instrumentation, Automation, Frequency, Frequency analysis, Oceans, Ocean waves, Oceanography.
Identifiers: *Automatic measurement.

The idea was advanced that the dominant wave frequency in a locally wind-generated sea may be accurately estimated from the ratio of root-mean-square surface vertical velocity to root-mean-square surface deviation. Field and laboratory data were used to establish the relationship between this ratio and the frequency of the peak of the spectrum as a function of inverse wave age. Wave age and the nondimensional fetch parameter were shown to be uniquely related in the fetch-limited case. Finally, a procedure was given for estimating the appropriate one-dimensional spectrum from automatic field measurements of average wind speed, root-mean-square surface deviation, and root-mean-square surface vertical velocity. (Sims-ISWS)
W77-03981

SPECTRA AND COHERENCE OF WIND-GENERATED INTERNAL WAVES,
British Columbia Univ., Vancouver. Inst. of Oceanography.
R. H. Kase, and C. L. Tang.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2323-2328, October 1976. 5 fig, 15 ref.

Descriptors: *Internal waves, *Winds, *Model studies, Mathematical models, Mathematical studies, Stress, Turbulence, Friction, Energy, Dynamics, Ocean waves, Oceans, Oceanography.

On the basis of a model for an internal wave field that is generated by a randomly varying isotropic wind stress and in which energy is transferred to small-scale turbulence, the two-dimensional energy density function was derived. The coherence scales were determined by the highest order internal wave mode that is not affected by virtual friction in the main thermocline, provided the curl of the wind stress has a white noise wave number spectrum. In general, this mode number scale is increasing monotonically with frequency. As a result of such a frequency dependent mode bandwidth, the vertical coherence drops with increasing frequency. (Sims-ISWS)
W77-03982

STRAIT OF GEORGIA OSCILLATIONS: LOW-FREQUENCY CURRENTS AND TOPOGRAPHIC PLANETARY WAVES,
British Columbia Univ., Vancouver. Inst. of Oceanography.
J. A. Helbig, and L. A. Mysak.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2329-2339, October 1976. 12 fig, 2 tab, 11 ref.

Descriptors: *Currents(Water), *Water circulation, *Straits, *Canada, Waves(Water), On-site investigations, Current meters, Model studies, Mathematical models, Energy, Topography, Estuaries, Oceanography.
Identifiers: *Strait of Georgia(Canada), *Water oscillations.

Chang recently showed that up to 46% of the horizontal kinetic energy in the Strait of Georgia, British Columbia, is contained in current oscillations possessing periods exceeding 4 days. In an attempt to explain these findings, a class of low-frequency oscillations in a model channel of the Strait of Georgia was studied. The Strait was modeled by an infinitely long, rectangular channel with a bottom that slopes upward to the east; the stratification was idealized by a two-layer system. The model admits northward-traveling, topographic planetary waves with frequencies that lie in the observed range for reasonable values of the wavelength. However, the model does not accurately predict the observed vertical distribution of the horizontal kinetic energy. (Sims-ISWS)
W77-03983

NUMERICAL MODEL STUDIES OF THE TIDES BETWEEN VANCOUVER ISLAND AND THE MAINLAND COAST,
Department of the Environment, Victoria (British Columbia). Ocean and Aquatic Affairs.
P. B. Crean.

Descriptors: *Straits, *Model studies, *Canada, Mathematical models, On-site investigations, Water levels, Tides, Tidal water, Currents(Water), Velocity, Coasts, Estuaries, Bays, Physical properties, Oceanography.
Identifiers: *Strait of Georgia(Canada), *Juan de Fuca Strait(Canada).

An extensive program of numerical model trials--employing joined one- and two-dimensional schemes--and observations have led to the successful simulation of barotropic tidal propagation in the complex system of channels and inlets between Vancouver Island and the mainland coasts. This paper presented some results obtained in the numerical simulation of a 7-day sequence of a 61-constituent mixed tide. An extensive program of field observations was carried out by the Canadian Hydrographic Service (Pacific Region) in connection with this work. The program included the simultaneous recording of water levels for at least 1 yr at 30 locations. Current data were obtained from arrays of meters moored over cross sections of the major conveying channels. Record lengths were generally about 30 days, though, in some instances, records over a year in length were obtained. The elevations computed by the model and those predicted on the basis of observations for two locations were compared. The agreement was good. The major components of velocity computed by the model agreed well with those predicted on the basis of observations. (Sims-ISWS)
W77-03984

NUMERICAL MODELING OF TIDES IN HUDSON BAY,
Department of the Environment, Victoria (British Columbia). Ocean and Aquatic Affairs; and Canada Centre for Inland Waters, Burlington (Ontario).
N. G. Freeman, and T. S. Murty.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2345-2361, October 1976. 15 fig, 3 tab, 15 ref.

Descriptors: *Model studies, *Tides, *Bays, *Canada, Mathematical models, Water levels, Currents(Water), Water circulation, Mathematical studies, Mathematics, Oceanography.
Identifiers: *Hudson Bay(Canada), *James Bay(Canada), Water oscillations.

A two-dimensional numerical model was developed to study the co-oscillating and independent tides in Hudson Bay. Using centered differences (forward differences for the dissipative term) and conjugate Richardson lattices, the LaPlace Tidal Equations in spherical polar coordinates were integrated in time until cyclic equilibrium was reached. For the co-oscillating tide, the direct tidal forcing term was set to zero, and the observed tidal constituent was specified at the mouth of Hudson Bay. Separate runs were made for M sub 2, S sub 2, N sub 2, and K sub 1. For the independent tide, the closed mouth boundary condition of zero water transport was imposed, and the model run for the M sub 2 and K sub 1 directed tidal forcing. A number of experiments were carried out to test the sensitivity of the model to uncertainties in the input data and parameterization of some of the erms. It was shown that the tidal propagation is relatively insensitive to friction coefficient and island schematization, but it is very sensitive to depth representation in the Belcher Island area and phase variation in the specified boundary conditions. Overall, the model gives good qualitative agreement with shore-based data and can be used to interpret tidal propagation in the Hudson-James Bay system. (Sims-ISWS)
W77-03985

STORM SURGES IN THE SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Inst. of Ocean Sciences.
R. F. Henry, and N. S. Heaps.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 10, p 2362-2376, October 1976. 13 fig, 14 ref.

Descriptors: *Storm surge, *Arctic, *Canada, Winds, Model studies, Mathematical models, Sea level, Equations, Water levels, Mathematical studies, Water level recorders, Ice cover, Topography, Meteorology, Coasts, Oceans, Oceanography.
Identifiers: *Beaufort Sea.

Evidence of storm surge occurrence in the Canadian sector of the southern Beaufort Sea was reviewed, and distinctions were drawn between surges occurring in the absence and presence of ice cover. Two numerical models were described. One model was intended for detailed simulation of past surges, and the other, a compact, economical model, was designed for operational forecasting of surges. The associated system used to obtain the required wind-stress input to the numerical models was also discussed. (Sims-ISWS)
W77-03986

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03993

AN APPROXIMATE SOLUTION FOR THE TRANSIENT INTERFACE IN A COASTAL AQUIFER,
Indian Inst. of Tech., Bombay.
For primary bibliographic entry see Field 2F.
W77-04001

ABYSSAL HYDROGRAPHY, NEPHELOMETRY, CURRENTS, AND

BENTHIC BOUNDARY LAYER STRUCTURE IN THE VEMA CHANNEL,
Woods Hole Oceanographic Institution, Mass.
D. A. Johnson, S. E. McDowell, L. G. Sullivan, and P. E. Biscaye.
Journal of Geophysical Research, Vol. 81, No. 33, p 5771-5786, November 20, 1976. 21 fig, 6 tab, 39 ref. NSF DES74-01744, ONR. N00014-74-C0262.

Descriptors: *Hydrography, *Oceanography, *Atlantic Ocean, *Hypolimnion, On-site investigations, Water temperature, Salinity, Instrumentation, Measurements, Currents(Water), Circulation, Ocean circulation, Oceans, Data collections, Submarine canyons, Thermocline, Turbidity, Boundary layers, Bathymetry, Deep water, Ocean currents, Topography.
Identifiers: *Vema Channel, Nepheloid layer.

New data from closely spaced hydrocasts, thermogra. profiles, vertical nephelometer profiles, and direct bottom current observations within the Vema Channel allow an interpretation of the flow regime and the structure of the benthic boundary layer. A sharp gradient in potential temperature, light scattering, concentration of suspended particulates, and excess radon is present in the transition zone between northward flowing antarctic bottom water (AABW) and the overlying north Atlantic deep water. This transition zone, however, exhibits pronounced east-west asymmetry across the channel axis. Near-bottom current velocities measured in both the main branch and the western branch of the channel exhibit a significant cross-contour component in the mean flow. The temperature and light scattering data are consistent with a model of an asymmetrical flow regime such that (1) strongest northward current velocities are adjacent to the western wall of the channel, (2) frictional effects due to the presence of the wall induce strong turbulence in the flow, (3) turbulent mixing within the AABW results in a 'blurring' of the benthic thermocline and slight elevation of near-bottom temperatures in the channel axis, and (4) upslope (eastward) advection in a bottom boundary Ekman layer results in a veering of the mean velocity vector and the transport of coldest bottom water to the eastern margin of the channel. Intervals of abrupt increase in bottom water turbidity within the channel axis show no obvious correlation with variations in current velocity observed simultaneously. Consequently, the time variability in the nepheloid layer may reflect varying rates of sediment entrainment upstream in the Argentine Basin rather than resuspension of sediment within the channel itself. (Humphreys-ISWS)
W77-04004

ON THE DESCRIPTION OF THE HYDROGRAPHIC STATE AND THE CIRCULATION IN THE BALTIC DEEP WATER,
Goteborg Univ. (Sweden). Oceanographic Inst.
G. Walin.
Hydrological Sciences Bulletin, Vol. 21, No 3 p 463-465, September 1976. 2 ref.

Descriptors: *Estuaries, *Circulation, *Theoretical analysis, *Mathematical studies, Ocean circulation, Oceans, Mixing, Salinity, Hydrography, Hydrologic aspects, Analytical techniques.
Identifiers: *Baltic Sea.

A theoretical framework for the description of an estuarine system was outlined, with particular reference to the Baltic. This description, in terms of continuous functions of salinity and time, may be considered as a logical improvement of existing 'box models', which are inherently incapable of making efficient use of hydrographic data. Relations were derived between deep water supply and internal mixing properties, as well as the equations controlling diffusion of substances in general. (Humphreys-ISWS)
W77-04006

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
J. C. J. Nihoul.
Applied Mathematical Modelling Vol. 1, No. 1, p 3-8, June 1976. 4 fig, 13 ref.

Descriptors: *Mathematical models, *Coasts, Sea water, Tidal waters, Projects, Ecology, Equations, Systems analysis, Model studies.
Identifiers: *Marine science, North Sea, Belgian coasts.

The essential elements of a general interdisciplinary marine model are reviewed; state variables are identified, evolution equations are discussed and major parameters indicated. The methods of reducing the size of the model by aggregation in state space (reduction of scope) or averaging in physical space (reduction of support) are revised with particular emphasis on the associated parameterization of the nonlinear effects. Examples of application are given in illustration and comparison of the models' predictions with observations indicates the degree of accuracy and the limits of viability of present state marine modelling. Considered specifically are mechanical state variables--Boussinesq theory, chemical and ecological state variables--aggregation and translocation theory, and reduction of support--parameterization of the nonlinear terms. The example application is the Math Modelsea Project, the Belgian Government's extensive physical, chemical and ecological survey of the North Sea progressively concentrating on the Southern Bight and the Belgian coastal waters. (Bell-Cornell)
W77-04008

CONCENTRATION OF POLYVALENT METALS BY SEAWEEDS IN VOSTOK BAY, SEA OF JAPAN,
Akademiya Nauk SSSR, Vladivostok.
For primary bibliographic entry see Field 5C.
W77-04023

HIGH SEAS OIL POLLUTION: PARTICULATE PETROLEUM RESIDUES IN THE NORTH ATLANTIC,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia).
For primary bibliographic entry see Field 5B.
W77-04025

ARSENIC CONCENTRATIONS IN SOME COEXISTING MARINE ORGANISMS FROM NEWFOUNDLAND AND LABRADOR,
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5C.
W77-04036

FIN EROSION DISEASE OF STARRY FLOUNDER (PLATICHTHYS STELLATUS) AND ENGLISH SOLE (PAROPHRYS VETULUS) IN THE ESTUARY OF THE DUWAMISH RIVER, SEATTLE, WASHINGTON,
California Univ., Davis. Dept. of Pathology.
For primary bibliographic entry see Field 5C.
W77-04038

RELATIONSHIPS OF EPIBIOTIC FOULING AND MORTALITIES OF EGGS OF THE DUNGENESS CRAB (CANCER MAGISTER),
California Univ., Bodega Bay. Bodega Marine Lab.
For primary bibliographic entry see Field 5C.
W77-04040

THE CONDITIONS FOR BIODEGRADATION OF PETROLEUM HYDROCARBONS AT SEA,
Aix-Marseille-3 Univ. (France). Laboratoire de Microbiologie.
For primary bibliographic entry see Field 5B.
W77-04042

LONG-TERM CHEMICAL EFFECTS OF PETROLEUM IN SOUTH LOUISIANA WETLANDS - 1. ORGANIC CARBON IN SEDIMENTS AND WATERS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 5C.
W77-04043

ACCUMULATION AND RELEASE OF PETROLEUM-DERIVED AROMATIC HYDROCARBONS BY FOUR SPECIES OF MARINE ANIMALS,
Texas A and M Univ. College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-04045

DISTRIBUTION AND ABUNDANCE OF HEAVY METALS IN FINFISH, INVERTEBRATES AND SEDIMENTS COLLECTED AT A DEEP WATER DISPOSAL SITE,
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Lab.; and National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5B.
W77-04046

EFFECT OF HEAVY METALS ON HATCHING OF BRINE SHRIMP EGGS,
Royal Univ. of Malta, Valletta. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-04047

THE EFFECT OF CHINA CLAY ON THE FISH OF ST. AUSTELL AND MEVAGISSEY BAYS,
Ministry of Agriculture, Fisheries and Food, Burnham-on-Crouch (England). Fisheries Lab.
For primary bibliographic entry see Field 5C.
W77-04049

DELETERIOUS EFFECTS OF COREXIT 9527 ON FERTILIZATION AND DEVELOPMENT,
Tromsoe Univ. (Norway). Inst. of Biology and Geology.
For primary bibliographic entry see Field 5C.
W77-04050

THE DISTRIBUTION OF SHORT-CHAIN HALOGENATED ALIPHATIC HYDROCARBONS IN SOME MARINE ORGANISMS,
Liverpool Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W77-04051

MOLECULAR TEST FOR OIL POLLUTION IN SURFACE SEDIMENTS,
Strasbourg Univ. (France). Institut de Chimie.
For primary bibliographic entry see Field 5B.
W77-04058

DISTRIBUTION OF HEAVY METALS IN TISSUES OF THE COMMON SEAL,
Liverpool Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-04059

MERCURY IN TISSUES OF MUSSEL OFF SOUTHERN CALIFORNIA,
Southern California Coastal Water Research Project, El Segundo, Calif.
For primary bibliographic entry see Field 5C.
W77-04060

AN ASSESSMENT OF THE POLLUTION OF CORNISH COASTAL WATERS,
Atkins Research and Development, Epson (England).
For primary bibliographic entry see Field 5B.
W77-04061

SOME EFFECTS OF PETROLEUM ON ESTUARINE AND MARINE MICRO-ORGANISMS,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-04063

MEROMICTIC MECHANISMS IN A COASTAL LAKE, (IN FINNISH),
Abo Akademi, Turku (Finland). Inst. of Biology.
For primary bibliographic entry see Field 5C.
W77-04071

DATA ON SEASONAL VARIATIONS IN PLANKTON AND ON THE HYDROLOGIC CHARACTERISTICS OF THE NORTH SEA, OFF OSTENDE AND NIEUWPOORT: PERIOD FROM 1969 TO 1971, (IN FRENCH),
Brussels Univ. (Belgium). Lab. of Comparative Anatomy.
For primary bibliographic entry see Field 5C.
W77-04072

ROLE OF THE MINERAL NUTRIENTS CONTRIBUTED BY THE RIVER RHONE (FRANCE) TO THE ORGANIC PRODUCTION OF THE WATERS OF THE GULF OF LIONS, (IN FRENCH),
For primary bibliographic entry see Field 5C.
W77-04073

A STUDY ON THE INFLUENCE OF SALINITY FLUCTUATIONS UPON THE BACTERIAL FLORA OF THE LAGOON CIENAGA GRADE DE SANTE MARTA (COLOMBIA) AND THE ADJACENT COASTAL REGION, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 5B.
W77-04076

WATER POLLUTION OF THE RIVERS FLOWING EASTWARDS INTO THE BAY OF ISE, (IN JAPANESE),
For primary bibliographic entry see Field 5B.
W77-04080

BACTERIOLOGICAL CHARACTERISTICS OF THE COAST WATERS IN THE DISTRICT OF CATANIA (ITALY), (IN ITALIAN),
Catania Univ. (Italy).
For primary bibliographic entry see Field 5G.
W77-04084

VARIATIONS IN CD, PB AND CU CONTENT OF WATERS OF THE LOWER ESTUARY OF THE SAINT LAWRENCE DURING THE SUMMER OF 1972, (IN FRENCH),
Quebec Univ., Rimouski. Dept. of Oceanography; and Quebec Univ., Rimouski. Dept. of Pure Sciences.
For primary bibliographic entry see Field 5A.
W77-04086

ON THE FAUNA OF A FRESHWATER FLAT IN THE ELBE ESTUARY (GERMANY), (IN GERMAN),
Hamburg Univ. (West Germany). Museum of Zoology.
For primary bibliographic entry see Field 5C.
W77-04087

COMPARATIVE INVESTIGATIONS ON THE SELF-PURIFICATION IN POLLUTED WATERS OF DIFFERENT SALINITIES, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 5G.
W77-04098

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

INHIBITION OF SCALE ON SALINE WATER HEAT EXCHANGE SURFACES WITH IMINODIACETIC ACID COMPOUNDS,
Grace (W. R.) and Co., Cambridge, Mass. (Assignee).
J. Block, and N. S. Marans.
U.S. Patent No. 3,981,779, 4 p, 4 ref; Official Gazette of the United States Patent Office, Vol 950, No 3, p 1126, September 21, 1976.

Descriptors: *Patents, *Water treatment, *Water purification, *Desalination, Evaporation, Distillation, *Scaling, *Chelation, Saline water, Surfactants, Desalination equipment, Evaporators.
Identifiers: *Chelant-surfactants.

Sea water contains a substantial amount of components which deposit onto metal containing and alloy containing surfaces as scale and related hydrophilic foulants. The alkaline scales, including calcium carbonate and magnesium hydroxide, are particularly troublesome in sea water evaporators. Chelant-surfactants having hydrophobic and chelating moieties may be used to decrease fouling. When used in accordance with this invention, such chelant-surfactants are believed to chelate with the metal or alloy-containing surfaces through chelating moieties and provide a hydrophobic barrier which aids in decreasing deposition of scale and similar hydrophilic deposits. Chelant-surfactants effective in the present invention include N-laurylimindiacetic acid, N-oleylimindiacetic acid, N-oleoylimindiacetic acid, alkali metal salts of the acids, ammonium salts of the acids, and the like. (Sinha-OEIS)
W77-03872

THE INTEGRATION OF DESALINATION PLANT WITH EXISTING AUSTRALIAN WATER RESOURCES,
New South Wales Univ., Kensington (Australia). School of Nuclear Engineering.
L. G. Kemeny.
Journal of Hydrology (Amsterdam), Vol. 28, No. 2/4, p 429-448, 1976. 8 fig, 4 tab, 14 ref, 2 append.

Descriptors: *Desalination plants, *Water resources, *Australia, *Water supply, Water utilization, Arid lands, Coasts, Economics, Hydrologic aspects, Salinity, Freshwater, Water storage, Water distribution(Applied), Costs, Size sites, Energy.
Identifiers: Costing.

Two-thirds of Australian land is arid; even the well-watered coastal areas are prone to prolonged droughts. Thus, the capital investment in water supply storage and distribution facilities is very high. These economic and ecological conditions demand alternative sources of fresh water supplemetation, probably desalination. A summary of Australian water resources is given, including geographical distribution of surface discharge and runoff, typical salinities of underground waters, and permissible limits of salinity. Considered next are the patterns of fresh water usage and the related costing practice; these are subdivided into domestic, industrial and agricultural supplies. A description of an existing desalination plant on the Western Australian Coast is given. Finally, general factors influencing the integration of desalination plant with existing water resources in Australia are summarized; discussed are water storage and distribution; plant size, siting and energy source; and integration and costing studies. (Bell-Cornell)
W77-04018

3B. Water Yield Improvement

PHYSIOLOGICAL RESPONSES TO RAINFALL IN OPUNTIA BASILARIS (CACTACEAE),
California Univ., Riverside. Dept. of Biology.
For primary bibliographic entry see Field 2I.
W77-03622

SOIL MOISTURE RESPONSE TO SEVERAL LEVELS OF FOLIAGE REMOVAL ON TWO UTAH RANGES,
Oregon State Univ., Corvallis. Rangeland Resources Program.
For primary bibliographic entry see Field 2G.
W77-03629

AUGMENTATION OF 1968-1972 WINTER STORMS IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Civil Engineering.
C. G. Keyes, Jr.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY12, Proceedings Paper 12616, p 1725-1735, December 1976. 6 fig, 1 tab, 6 ref, 1 append. Bu. Rec. 14-06-D-6803.

Descriptors: *Cloud seeding, *New Mexico, *Winter, *Storms, Computer programs, Evaluation, Meteorology, Precipitation(Atmospheric), Precipitation intensity, Snow, Snowpack, Temperature, Water management(Applied), Orography, Statistics.
Identifiers: *Jemez Mountains(NM), Data systems, Randomization, Equivalent potential temperature.

Scientific studies on winter orographic cloud seeding were conducted in the Jemez Mountains of northern New Mexico during the winters of 1968-1969 through 1971-1972. The objective specific components and accomplishments of the project were summarized. The 'meteorological partitioning technique' used in conjunction with the nonparametric statistical analysis indicated that future projects in northern New Mexico should use the 700-mb equivalent potential temperature optimum window until a more refined criteria can show better results in overall snowpack increase. This assumed optimum window resulted in a net seasonal increase of precipitation of about 28%, or 14.5 cm of equivalent water in 4 yr. Assuming an affected area of about 1,300 sq km, this increase would be about 49,000,000 cu m (40,000 acre-ft) of additional water on the ground per year of winter cloud seeding. (Jones-ISWS)
W77-03838

PRODUCT AND METHOD FOR REDUCING WATER LOSS THROUGH SOIL BY SEEPAGE,
Flintkote Co., White Plains, N. Y. (Assignee).
F. L. Califano, G. Stepien, Jr., and T. E. Russell.
U.S. Patent No. 3,979,916, 14 p, 10 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 495, September 14, 1976.

Descriptors: *Patents, *Seepage, *Seepage control, *Water loss, *Sealants, Reservoir leakage, Bodies of water, Water control, Asphalt, Linings.

The object of this invention is to provide a composition for and a method for applying that composition to natural and man-made ground surfaces in water containment and transfer systems to impermeabilize them. The composition penetrates

and combines with the ground surface to a significant degree to form a tough, flexible and water impervious mass. The composition is comprised of an aqueous emulsion of asphalt including a cationic emulsifier, a nonionic surface active agent and elastomer solids. The compositions are adapted for spray, roller, brush or flooding, etc., application, on natural and man-made beds of rivers, ponds and other water impoundment and transfer structures. The stability of the emulsion is controlled so that penetration of the soil is achieved, and a flexible water impervious mass is obtained. (Sinha-OEIS)
W77-03863

3C. Use Of Water Of Impaired Quality

EFFECT OF UREA AND AMMONIUM SULPHATE APPLIED BEFORE SOWING ON SUDANGRASS SEEDLINGS,
California Univ., El Centro. Imperial Valley Field Station.
G. F. Worker, Jr.
Journal of Agricultural Science, Vol. 86, No. 1, p 17-21, February, 1976. 2 fig, 6 ref.

Descriptors: *Ureas, *Fertilizers, *Nitrogen compounds, *Crop response, *Sundangrass, *Ammonium compounds, Crops, Agriculture, Leaching, Irrigation practices, Irrigation, Infiltration, Nitrogen, Crop production, Evapotranspiration, Soil moisture, Field capacity, Root zone, Arid lands.

Nitrogen as well as other plant elements will be very important in the development and growth of crops on the Sahara sands of southeastern Libya. Studies were conducted to determine possible leaching or fixation problems in growing sundangrass when urea, ammonium sulphate plus triple superphosphate, and ammonium polyphosphate fertilizer were applied as a seed-bed application to the very sandy soils of the Libyan Sahara near the Kufra Oasis. The effectiveness of the nitrogen source was measured by plant color, leaf analysis, and seedling height. Results indicate that under these virgin sandy soil conditions, the ammonium sulphate and ammonium polyphosphate fertilizers applied to the seed bed were retained within the root zone in sufficient amounts to give a vigorous, non-deficient sudangrass seedling. Nitrogen from urea was deficient and presumed leached beyond reach of the seedling root when applied to the seed bed. Applied post emergence, however, urea was a very satisfactory source of nitrogen. (Jamail-Arizona)
W77-03633

DESERTIFICATION AND THE SALINITY PROBLEM IN AUSTRALIA,
University of New England, Armidale (Australia). Dept.of Geography.
For primary bibliographic entry see Field 4C.
W77-03741

USE OF EFFLUENTS FROM FERMENTATION PLANTS FOR FIELD IRRIGATION (ISPOL'ZOVANIE STOCHNYKH VOD GIDROLIZNYKH ZAVODOV DLYA OROSHENIYA POLEI),
For primary bibliographic entry see Field 5D.
W77-03814

IRRIGATION EFFICIENCY, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 3F.
W77-03968

3D. Conservation In Domestic and Municipal Use

LEGAL CONSTRAINTS ON URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg.
Journal of the Urban Planning and Development Division, Proceedings of ASCE, Vol 99, p 137-145 (1973). 8p, 1 Chart, 27 ref.

Descriptors: *Colorado, *Water resources development, *Water conservation, *Water supply development, *Urban hydrology, *Community development, Legal aspects, Administration, Cities, Comprehensive planning, Governments, Optimum development plans, Planning, Regional development, Water policy, Water supply.

Intelligent and farsighted water management requires the use of various methods of problem/solution analysis. This article examines water management at the general planning and decision-making levels rather than at the technical design level and uses the 'systems approach' to offer solution to urban water management problems. Legal constraints often work against improvements offered in the management of water systems while at the same time influencing goal formulation and fulfillment. The water law in the United States is largely state law; to illustrate the various legal contracts, both local, state and federal, on a real system, the author uses a consideration and analysis of the Denver, Colorado, Metropolitan region. The need for agreement on regional goals is strongly emphasized so that more thorough analysis of large-scale improvements will be possible. (Welch-Florida)
W77-03692

LEAST COST CONTROL STRATEGIES IN URBAN DRAINAGE DESIGN -- A DYNAMIC PROGRAMMING APPROACH,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W77-04007

3E. Conservation In Industry

AN INVESTIGATION OF CONDENSATES AND THEIR CONTRIBUTION TO EFFLUENT DISPOSAL FROM SUGAR MILLS. PART II. STUDIES ON THE REMOVAL OF ETHANOL FROM CONDENSATES,
Sugar Research Inst., Mackay (Australia).
For primary bibliographic entry see Field 5D.
W77-03601

CHEMICAL-INDUSTRY COSTS OF WATER POLLUTION ABATEMENT,
IR and T, Arlington, Va.
For primary bibliographic entry see Field 5D.
W77-03604

NESTLE AND POLLUTION CONTROL,
For primary bibliographic entry see Field 5D.
W77-03607

PILOT SCALE HIGH GRADIENT MAGNETIC FILTRATION OF STEEL MILL WASTEWATER,
Sala Magnetics, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5D.
W77-03609

REVERSE OSMOSIS FOR THE TREATMENT OF METAL WASTE SOLUTIONS,
Department of Energy, Mines and Resources, Ottawa (Ontario). Extraction Metallurgy Div.
For primary bibliographic entry see Field 5D.
W77-03610

POTENTIALS OF USING SPENT OXYGEN BLEACHING LIQUOR IN THE SULPHITE PROCESS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshelennosti, Leningrad (USSR).
For primary bibliographic entry see Field 5D.
W77-03615

IN-PLANT, OUTSIDE POLLUTION EVILS, ENERGY SAVING TOP AATCC CONCERNS.
For primary bibliographic entry see Field 5G.
W77-03620

THE POTENTIAL FOR NUCLEAR AND GEOTHERMAL POWER PLANT SITING IN IDAHO AS RELATED TO WATER RESOURCES,
Idaho University, Moscow, Dept of Civil Engineering.
L. F. Heitz, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 237, Price codes: A06 in paper copy, A01 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, March 1975. 100 p, 24 fig, 4 tab, 107 ref. (M. S. Thesis supported by Idaho Nuclear Energy Commission).

Descriptors: *Water cooling, *Nuclear powerplants, *Geothermal studies, Temperature, Water quality standards, *Idaho, *Sites, Thermal pollution, *Energy, Thermal power, Institutions.
Identifiers: Uranium enrichment facilities, Thermal effluent standards, *Thermal energy.

The basic purpose is to determine the availability of cooling water in the State of Idaho for use in nuclear and geothermal power production and uranium enrichment facilities. Part of the investigation deals with physical requirements for cooling water in power production, using charts and graphs to show various cooling requirements according to the system. Water laws and standards are also investigated indicating that EPA regulations may limit and even eliminate once-through cooling in Idaho. However, possible sites are mentioned should EPA standards relax based on a survey of existing supplies of water useable in cooling energy facilities. Other methods for cooling such as pumped storage reservoirs, irrigation canals, and other storage-nuclear power plant combinations are discussed as alternative means of cooling. Finally, the author's view presented on the state's direction in terms of energy development and institutional regulations, in terms of the role of thermal energy as a problem to be faced now and in terms of the necessity of establishing a progressive program to develop thermal power.
W77-03730

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE COPPER, NICKEL, CHROMIUM, AND ZINC SEGMENT OF THE ELECTROPLATING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W77-03775

REDUCTION OF FRESH WATER CONSUMPTION AT THE KONDOPOGA MILL FOR THE MANUFACTURE OF PULP (OPYT RABOTY KONDOPOZHNOGO KOMBINATA PO

COKRASHCHENIYU RASCHODA SVEZHEI VODY V TSELLYULOZNOM PROIZVODSTVE),
Kondopozhskii Kombinat (USSR).
S. D. Mamzelev.
Bumazhnaya Promyshlennost No. 9, p 18, September, 1976.

Descriptors: *Pulp and paper industry, *Water conservation, *Water consumption(Except consumptive use), *Water reuse, Pulp wastes, Water pollution control, Sulfite liquors, Wastes, Industrial wastes, Foreign countries, *Recycling, Waste treatment, Waste water treatment, Pollution abatement, Industrial water.
Identifiers: *Sulfite pulp mills, Closed systems, USSR.

Fresh water consumption in the manufacture of sulfite pulp at the Kondopoga mill (USSR) was reduced from 180 to 71 cu m/ton in 1975 and to 54 cu m in 1976. At the same time, the annual loss of fibers with discharged effluents was reduced from 313 to 55 tons. This was accomplished through several measures aimed at closing the water cycle. Recycled water is used in many processes, e.g., for cooling sulfur dioxide in the gas scrubber, pulp dilution, etc. Plans call for further reduction of fresh water consumption through expanded reuse of water and better utilization of the spent sulfite liquor (yeast-production and evaporation of the spent fermentation liquor). (Stapinski-IPC)
W77-03790

MANUFACTURE OF BOXBOARD IN A CLOSED WATER CYCLE (PROIZVODSTVO KOROBOCHNOGO KARTONA PRI ZAMKNUTOM VODOOBOROTE),
Suoyarvskaya Kartonnaya Fabrika (USSR).
R. A. Narymskaya, L. P. Zakharova, T. K. Toporova, Y. V. Nikitin, and E. I. Vilenskaya.
Bumazhaya Promyshlennost, No. 7, p 22-23, July, 1976. 1 fig, 2 tab.

Descriptors: *Water reuse, *Pulp and paper industry, *Water conservation, Water pollution control, Water consumption, Suspended solids, Organic wastes, Inorganic compounds, Pulp wastes, Effluents, Water management(Applied), Slime, Recirculated water, Reclaimed water, Water pollution sources, Industrial water, Cooling water, Foreign countries.
Identifiers: *Board mills, Closed systems, White water(Paper machines), Wash water, *USSR.

The closed-circuit manufacture of boxboard has recently been introduced at the Suoyarvi board mill in USSR. The boxboard is produced from a blend of waste paper stock and low-grade pulp. The total water consumption is 36 cu m/ton, and only water losses up to 3.6 cu m/ton are replaced by fresh water, the remaining 32.4 cu m/ton being biologically purified white water. This water serves the needs of two board machines for washing of cylinder molds, felts, and suction press rolls, and for cooling of bearings and is also used for cleaning vacuum filters of excess activated sludge. The pollution level of the white water (suspended solids, dissolved organic and inorganic substances) increased slightly and reached a maximum after 8-10 days, then remained at a constant level with slight variations. No technical difficulties were experienced, and there was no slime formation. (Stapinski-IPC)
W77-03791

DESIGN OF AN EFFICIENT WATER SYSTEM FOR A KRAFT PULP MILL,
Main (Charles T.), Inc., Boston Mass.
For primary bibliographic entry see Field 5D.
W77-03804

WATER TREATMENT FOR BOILER OPERATING PRESSURES ABOVE 1200 PSIG,
Ecodyne Corp., Union, N. J. Graver Water Div.
L. Limon.
TAPPI Engineering Conference, Houston, October 4-7, 1976, Preprinted Proceedings Book I, (TAPPI, Atlanta, Ga.), p 136-139. 8 fig, 2 ref, 5 tab.

Descriptors: *Boiler feed water, *Water treatment, Industrial water, Demineralization, Water supply, Ion exchange, Equipment, Operating costs, Reverse osmosis, Membrane processes, Separation techniques, Costs, Chemicals, Capital costs, Corrosion control.

Boilers operating at 1200 psig and higher pressures require high-quality feedwater. Since this feedwater is normally one-half makeup and one-half condensate, treatment of both streams is necessary. Typical makeup water demineralizers for different water supplies and ion-exchangers for treatment of condensate are described. Equipment and operating costs for reverse osmosis treatment versus demineralization of water are compared. Present-day needs of high reliability, high chemical costs, as well as high initial costs, demand careful study of alternative treatment methods. (Witt-IPC)
W77-03805

REDUCTION OF DEPOSIT FORMATION IN HEAT EXCHANGERS (SNIZHENIE OSADKOOBRAZOVANIYA V TEPLOOBMENNOI APPARATURE),
For primary bibliographic entry see Field 8G.
W77-03808

GREAT LAKES (PAPER CO.) PIONEERS TOMORROW'S TECHNOLOGY,
For primary bibliographic entry see Field 5D.
W77-03809

UTILIZATION OF THE SPENT SULFITE LIQUOR COMPONENTS IN THE PEKILO PROTEIN PROCESS AND THE INFLUENCE OF THE PROCESS UPON THE ENVIRONMENTAL PROBLEMS OF A SULFITE MILL,
For primary bibliographic entry see Field 5D.
W77-03816

EXPERIENCES IN CLOSING THE WATER SYSTEM IN A PAPER AND BOARD MILL (ERFAHRUNGEN BEI DER KREISLAUFSCHLIESSUNG EINER PAPIER- UND KARTONFABRIK),
For primary bibliographic entry see Field 5D.
W77-03818

BIOLOGICAL EFFLUENT CLARIFICATION IN THE PAPER MILL CIRCULATION SYSTEM (BIOLOGISCHE ABWASSERAUFBEREITUNG IM KREISLAUF EINER PAPIERFABRIK),
For primary bibliographic entry see Field 5D.
W77-03824

NATIONAL ECONOMIC MODELS OF INDUSTRIAL WATER USE AND WASTE TREATMENT,
Houston Univ., Tex.
For primary bibliographic entry see Field 5D.
W77-03928

MODELING PROCESS SUBSTITUTIONS BY LP AND MIP,
Resources for the Future, Inc., Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03933

EXAMINATION OF ENVIRONMENTAL POLICIES USING PRODUCTION AND POLLUTION MICROPARAMETER DISTRIBUTIONS,
Tel-Aviv Univ. (Israel). Foerder Inst. for Economic Research.
For primary bibliographic entry see Field 6G.
W77-03961

GEOTHERMAL TECHNOECOSYSTEMS AND WATER CYCLES IN ARID LANDS,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 6G.
W77-03966

3F. Conservation In Agriculture

ISOLATION AND CHARACTERIZATION OF DROUGHT TOLERANCE IN A GRAIN SORGHUM (SORGHUM BICOLOR (L) MOENCH) RANDOMMATING POPULATION,
Arizona Univ., Tucson. Dept. of Plant Sciences.
For primary bibliographic entry see Field 2I.
W77-03623

YIELD RESPONSES OF TWO MAIZE CULTIVARS FOLLOWING SHORT PERIODS OF WATER STRESS AT TASSELING,
Buenos Aires Univ. (Argentina). Dept. of Ecology.
A. Soriano, and H. D. Ginzo.
Agricultural Meteorology, Vol. 15, p 273-284, 1975. 7 tab, 20 ref.

Descriptors: *Moisture deficit, *Crop response, *Droughts, *Moisture stress, *Corn(Field), Crop production, Stress, Growth stages, Water balance, Grains(Crops), Moisture availability, Moisture tension, Soil water, Soil moisture, Soil-water-plant relationships, Moisture content, Cereal crops, Sands.
Identifiers: Leaf water potential.

The response of most annual crops to drought strongly depends upon the developmental stage of the plants at the time water becomes limited, defined as the 'critical period'. There is not enough information to assess (1) whether drought at the critical period changes the pattern of dry-matter distribution in a mature plant and, provided it does, (2) how a new partition of dry matter affects grain yield. These possibilities were investigated on two maize hybrids, Abati No. 2 and DeKalb F880, grown in sand-water cultures outdoors. At tasseling, both cultivars were subjected to drought by withholding water from the plants. Leaf water potential at the end of each droughting treatment was usually higher in DeKalb than in Abati. Total dry matter and grain yields per plant in both hybrids were directly related to leaf water potential at tasseling in plants droughted for 0, 3, or 5 days. Six days of drought decreased the total dry-matter of DeKalb F880 to a value below that of Abati but the grain yield of the former hybrid was much higher than that of the latter. It is concluded that the responses exhibited by DeKalb F880 represent an important advantage for maize cultivars grown in areas where drought spells are likely to occur during the early growth of the ears. (Jamail-Arizona)
W77-03628

EFFECT OF UREA AND AMMONIUM SULPHATE APPLIED BEFORE SOWING ON SUDANGRASS SEEDLINGS,
California Univ., El Centro. Imperial Valley Field Station.
For primary bibliographic entry see Field 3C.
W77-03633

MOISTURE USE EFFICIENCY OF DRYLAND CROPS AS INFLUENCED BY FERTILIZER USE, III. OILSEED CROPS,
Central Arid Zone Research Inst., Jodhpur (India). Dry Farming Research Main Centre.
R. P. Singh, and Y. S. Ramakrishna.
Annals of Arid Zone, Vol. 14, No. 4, p 320-328, December, 1975. 6 tab, 3 ref.

Descriptors: *Oilseed crops, *Crop production, *Consumptive use, *Fertilizers, *Soil-water-plant relationships, Rainfall, Moisture content, Soil

moisture, Stress, Nitrogen, Irrigation efficiency, Moisture stress, Cereal crops, Crop response, Arid lands.

Oilseed crops are high value crops and adapt better than other cereal crops to moisture stress conditions. The impact of fertilizer use on drylands in improving the moisture use efficiency of various oilseed crops was investigated. Two separate field experiments were conducted and the results presented. Fertilizer use resulted in higher yields and moisture use efficiency of all the oilseed crops tested except for one experiment with groundnuts. Under late sown conditions, castor gave the highest moisture use efficiency, followed by sunflowers. In good rainfall years like 1973, groundnuts gave higher yield than castor and sunflowers and exhibited a higher moisture use efficiency. The data concerning total consumptive use and moisture use efficiency of all the oilseed crops tested is presented. On the whole, fertilizer use in oilseed crops resulted in higher yields and better moisture use efficiency. (See also W76-10186) (Jamail-Arizona)
W77-03634

ESTIMATING RELATIVE LEAF WATER CONTENT WITH A SIMPLE BETA GAUGE CALIBRATION,
Soil Conservation Service, Klamath Falls, Oreg.
For primary bibliographic entry see Field 7B.
W77-03635

REACTION PRODUCTS OF POLYPHOSPHATES AND ORTHOPHOSPHATES WITH SOILS AND INFLUENCE ON UPTAKE OF PHOSPHORUS BY PLANTS,
Kansas State Univ., Manhattan. Dept. of Agronomy.
Y. V. Subbarao, and R. Ellis, Jr.
Soil Science Society of America Proceedings, Vol 39, No 6, 1085-1088, November-December 1975. 7 fig, 3 tab, 8 ref.

Descriptors: *Phosphorus, *Corn(Field), Crop response, Nutrients, Fertilizers, Fertilization, Chemical reactions, Absorption.
Identifiers: *Polyphosphates, *Orthophosphates.

Ammonium polyphosphate and diammonium phosphate were compared as sources of P for corn in a growth chamber experiment with an alkaline-calcareous soil and a slightly-acid soil. Reaction products of the two P sources in soils and soil extracts correlated with results obtained in the growth chamber. Applied P increased dry weights, uptake of P by the plants, and available soil P in the slightly acid soil. Both sources of P effectively supplied P for plant growth on this soil. Ammonium and magnesium orthophosphates, formed as reaction products in the laboratory experiments when the two P fertilizer materials were added, should furnish sufficient P for plant growth. (Skogerboe-Colo St)
W77-03636

THE EFFECTS OF STREAMFLOW VARIATION ON PRODUCTION AND INCOME OF IRRIGATED FARMS OPERATING UNDER THE DOCTRINE OF PRIOR APPROPRIATION,
Economic Research Service, Fort Collins, Colo. Natural Resource Economics Div.
R. L. Anderson.
Water Resources Research Vol 11, No 1, p 15-22, February 1975. 5 fig, 11 tab, 4 ref.

Descriptors: Irrigation, *Irrigation practices, *Streamflow, *Prior appropriation, Water supply, Runoff, Variability, Water rights, *Crop production.

Many irrigated farms dependent upon varying streamflow frequently encounter periods of inadequate water supply because streamflow is inadequate to serve all water rights. Streams fed by mountain snowmelt exhibit sharply peaked hydrographs. During the peak runoff period most water rights can be served. Thereafter streamflow declines rapidly, and many of the later water rights are denied water. Farms that are prohibited from diverting water suffer reduction in crop yields and income. To get the most benefit from varying flow, streams must be closely monitored so that as many rights as possible can be served with the original flow and the return flow that occurs. (Skogerboe-Colo St)
W77-03637

LOSSES OF DIURON, LINURON, FENAC, AND TRIFLURALIN IN SURFACE DRAINAGE WATER,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 5G.
W77-03639

EFFECT OF DEW ON LEAF WATER POTENTIALS AND CROP RESISTANCES IN A PASPALUM PASTURE,
Department of Scientific and Industrial Research, Palmerston North (New Zealand).
J. P. Kerr, and M. F. Beardsell.
Agronomy Journal, Vol. 67, No. 5, p 596-599. September-October. 1975. 3 fig, 28 ref, 1 append.

Descriptors: *Dew, *Pastures, *Pasture management, *Evapotranspiration, Agriculture, Crop response.
Identifiers: *Leaf water potentials.

Opportunities for comparing the water status of crops when the presence or absence of dew is the main environmental variable are rare. Results are reported of such a comparison made on successive days on a paspalum pasture. Leaf water potentials were measured with a pressure chamber, and the energy balance method was used to determine evapotranspiration. Crop resistances were calculated from the micrometeorological data. The presence of dew halved the early morning crop resistances. The paspalum pasture did not appear to exercise stomatal control over evapotranspiration until most of the dew had evaporated. (Skogerboe-Colo St)
W77-03736

DESERTIFICATION: SYMPTOM OF A CRISIS,
International Center for Arid and Semi-Arid Land Studies, Lubbock, Tex.
For primary bibliographic entry see Field 4C.
W77-03737

HOSE OR PIPE FOR SPRINKLING OR IRRIGATION,
Interdisciplin Forschungsgesellschaft m.b.H. Entwicklungs K.G., Karsruhe (West Germany). (Assignee).
D. Kabai.
U.S. Patent No. 3,980,104, 4 p, 9 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 558, September 14, 1976.

Descriptors: *Patents, Irrigation, *Sprinkler irrigation, Irrigation practices, *Irrigation efficiency, Flow control, Water delivery, Fluid mechanics, *Pipes, *Hoses, Fertilization.

The invention provides a hose or pipe for sprinkling or irrigation in which the flow rate of fluid through the individual orifices remains constant and is equal along the length of the hose. This object is attained by providing a hose whose outlet orifices are apertures in an elastic material, e.g. rubber or plastic and are located in concave or convex bulges of the hose. These orifices experience a geometric deformation when the shape and curvature of the surrounding elastic material changes depending on the local, internal fluid pressure. The deformation of the orifices is such that the flow rate at the individual apertures remains the same over the entire length of the hose even though the internal local fluid pressure is different at each orifice. When rigid pipes are to be used, the outlet orifices are located in elastic inserts which are placed in suitable periodic openings of the rigid pipe and which effect the closure function. Since the out-flow rate remains constant along the length of the hose or pipe, the sprinkler installations can be very long, thus reducing the need for multiple sprinkling or irrigation apparatus. (Sinha-OEIS)
W77-03864

IRRIGATION PIPES WITH DRIPPER UNITS AND METHOD OF ITS MANUFACTURE,
G. Eckstein.
U.S. Patent No. 3,981,452, 3 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 950, No 3, p 1020, September 21, 1976.

Descriptors: *Patents, *Irrigation, Irrigation practices, *Irrigation efficiency, Application equipment, Pipes.
Identifiers: *Drip irrigation.

A dripper unit comprises a cylinder provided with a continuous groove on its peripheral surfaces and is tightly surrounded by a sleeve. The groove has an integral inlet in the cylinder while an outlet is provided in the sleeve. The groove may be a continuous spiral, may have a labyrinth path or may be of any of the known shapes which reduce the pressure of the water from the supply pipe so that it leaves the dripper unit in a trickle. An irrigation pipe is provided with a dripper unit in which the dripper units constitute an integral part of the pipe without the necessity of assembling them at the irrigation site. With such a pipe much labor and time is saved when laying the pipe for irrigation since the units do not have to be attached at the required spaces. (Sinha-OEIS)
W77-03871

GROUND WATER MANAGEMENT AND SURFACE WATER DEVELOPMENT FOR IRRIGATION,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 4B.
W77-03929

OPTIMIZATION OF CROP IRRIGATION STRATEGY UNDER A STOCHASTIC WEATHER REGIME: A SIMULATION STUDY,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
J. Ahmed, C. H. M. van Bavel, and E. A. Hiler.
Water Resources Research, Vol 12, No 6, p 1241-1247, December 1976. 5 fig, 2 tab, 26 ref.

Descriptors: *Irrigation efficiency, *Crop response, *Water utilization, *Simulation analysis, *Optimization, Crops, Decision making, Weather, Texas, Sorghum, Soil, Atmosphere, Water resources, Management, Agriculture, Computer models, Equations, Operations research, Irrigation water, Water policy, Conservation.

A dynamic simulation model of the soil-water-atmosphere-plant system is developed as a tool for irrigation decision making under a stochastic weather regime and when water supplies are limited. Crop yield, foliage development, plant water deficits, and irrigation decisions have been treated as interdependent processes. Yield susceptibility of the crop to water deficit is a function of crop growth stage. The stomatal regulation of transpiration by the crop has been accounted for as well. The model is a closed loop dynamic system, in which past irrigation decisions and weather conditions affect the current as well as the future response of the crop system, and consequently, the future irrigation decisions and the overall water use efficiency. Determined are the optimal irrigation timing and quantities; estimated

are the associated yields, the water use efficiencies, and the trade-offs between water conservation and crop yield. The crop growth and yield simulation consists of two parts: (1) a dynamic crop growth and plant behavior model under stochastic weather regime and specific irrigation strategy; and (2) a seasonal crop stress computation for the simulated crop with associated yield estimates. The optimization criteria, water use efficiency, is defined as the ratio of crop yield to total amount of irrigation water used in its production. Specific illustration is given by considering grain sorghum grown under weather conditions typical for south central Texas. (Bell-Cornell)
W77-03941

IRRIGATION EFFICIENCY, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D. C.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 155, Price codes: A22 in paper copy, A01 in microfiche. Water Resources Scientific Information Center Report OWRT/WRSIC 76-206, December 1976, 506 p.

Descriptors: *Irrigation efficiency, *Bibliographies, Crop production, Drip irrigation, Irrigation effects, Irrigation practices, Patents, Salinity, Soil moisture, Sprinkler irrigation, Trickle irrigation, Water requirements, Water utilization.

This report, containing 346 abstracts, is another in a series of planned bibliographies in water resources produced from the information base comprising SELECTED WATER RESOURCES ABStracts (SWRA). Volume 2 covers the period from March 1973 through September 1976 (Volume 9, Number 18). Author and subject indexes are included. (See also W73-09115)
W77-03968

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

ESTIMATED WATER BALANCE FOR THE PROPOSED HADITHA RESERVOIR ON THE EUPHRATES RIVER IN IRAQ,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
A. H. Al-Hadithi.
Master of Science Thesis, 1976. 61 p, 6 fig, 15 tab, 16 ref.

Descriptors: *Water balance, *Reservoirs, *Reservoir storage, *Reservoir leakage, *Reservoir evaporation, Climatic data, Inflow, Discharge(Water), Hydrogeology, Evaporation, Seepage, Water loss, Water storage, Dams, Irrigation, Flood control, Hydroelectric power, Reservoir sites, *Pre-impoundment.
Identifiers: *Iraq, *Euphrates River(Iraq), Haditha Reservoir(Iraq).

The Iraqi Government is considering the construction of a dam on the Euphrates River to better control water for irrigation on the Mesopotamian Plain, to generate hydro-electric power, and to alleviate flooding. A study was conducted to estimate the magnitude of possible losses from the reservoir due to seepage and evaporation. All the components necessary to estimate the water balance were themselves estimated. These included: inflow estimates based on the historical flow regime of the river but adjusted for the water requirements in Syria and Turkey; evaporation from the reservoir estimated from pan evaporation data; and seepage losses estimated by the Green and Ampt approach for infiltration. The estimated evaporation and seepage losses are expected to be about 14 percent of the inflow to the reservoir during the first ten years of operation. The water balance definitely shows that the quantity of water available for releases will not be sufficient to meet expected requirements on the Mesopotamian Plain. The development of operatin rules for the reservoir is suggested to minimize spills through the spillway and more effectively use the water (Jamail-Arizona)
W77-03625

CALIFORNIA WATER LAW IN PERSPECTIVE,
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 6E.
W77-03689

LEGAL CONSTRAINTS ON URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3D.
W77-03692

ANALYSIS OF THE NATIONAL FLOOD INSURANCE ACT,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03693

ARTIFICIAL AND NATURAL LAKES,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03694

OWNERSHIP OF SUBMERGED LANDS IN FLORIDA,
Miami Univ., Coral Gables, Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03695

LEGAL PROTECTION FOR FLORIDA WETLANDS,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03696

WATER RESOURCES DATA SYSTEM,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W77-03728

THE APPLICATION OF HYMO TO STUDY AREAS OF SOUTHWESTERN WYOMING FOR SURFACE RUNOFF AND SOIL LOSS ESTIMATES,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 968, Price codes: A03 in paper copy, A01 in microfiche. Water Resources Series No. 60, June 1976. 38 p, 20 fig, 5 tab, 7 ref.

Descriptors: *Wyoming, *Computer models, Hydrologic models, Rainfall-runoff relationships, Erosion, Range management, *Streamflow forecasting, *Soil loss, *Surface runoff, Soil conservation, Model studies, Rainfall, Water conservation.
Identifiers: Computer simulation, Streamflow records, Water supply forecasting, HYMO.

Ephemeral stream runoff and soil losses were estimated for small basins in southwestern Wyoming using HYMO, a computer model that computes runoff and soil loss from precipitation and basin characteristics. Computed runoff was compared to measured runoff in one basin and a sensitivity analysis was made of the model. The comparison and analysis pointed out critical input variables requisite to reliable results. Runoff and soil loss graphs were prepared for the study basins as indicators of the effects of changes in range management practices.
W77-03729

THE PROJECTED ECONOMIC IMPACT OF THE RICHARD B. RUSSELL DAM AND LAKE UPON SOUTH CAROLINA,
Clemson Univ., S. C. Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6B.
W77-03735

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
For primary bibliographic entry see Field 6F.
W77-03774

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03831

SOME PROBLEMS IN THE STUDY OF THE INUNDATION OF RIVER FLOOD PLAINS BY AEROSPACE METHODS,
V. G. Prokacheva, and V. F. Usachev.
Soviet Hydrology, Selected Papers, No. 1, p 6-12, 1975. 5 fig, 2 tab, 21 ref. Translated from Trudy Gossudarstvennogo Gidrologicheskogo Instituta, No 205, p 40-54, 1975.

Descriptors: *Remote sensing, *Floods, *Flood plains, Aerial photography, Satellites(Artificial), Radar, Rivers, Flood peak, Flood data, Surveys, Aircraft, Photography, Mapping.
Identifiers: *Space photographs.

Many scientific and practical problems are associated with flood plain inundation and emptying. This paper reported investigation of the possibilities of recording the external picture of inundations by ground, aircraft, and space methods. It was concluded that the method of successive aerial photo surveys is a sufficiently reliable and objective means for obtaining data on the inundation of flood plains and flooding boundaries. However, there are many obstacles for its broad use. The labor and high cost of large-scale areal air photo surveys of an inundated flood plain permit use of this method only for small flood plain areas. An even more important limiting factor is the weather, which makes it very difficult, and sometimes impossible, to perform these surveys during a given stage on the flood plain. The use of aircraft radar surveys considerably broadens the possibilities of research. The examples cited of the use of radar images showed that they can be applied to hydrologic interpretation of flood plain inundations. Modern aircraft methods of aerial photo surveys can be used in practice to study only limited flood plain areas, i.e., for local investigations. Regional studies of the inundation and emptying of flood plains along an entire river are possible only from the material of high-altitude (space) surveys. (Sims-ISWS)
W77-03847

HYDROLOGIC ASPECTS OF SPACE INVESTIGATIONS OF THE EARTH'S SURFACE (LITERATURE SURVEY),
For primary bibliographic entry see Field 7B.

W77-03848

PRODUCT AND METHOD FOR REDUCING WATER LOSS THROUGH SOIL BY SEEPAGE,
Flintkote Co., White Plains, N. Y. (Assignee).
For primary bibliographic entry see Field 3B.
W77-03863

ERTS-1, A NEW WINDOW ON OUR PLANET,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7B.
W77-03875

SEEPAGE STUDY OF CANALS IN BEAVER VALLEY, BEAVER COUNTY, UTAH,
Geological Survey, Salt Lake City, Utah.
R. W. Cruff, and R. W. Mower.
Utah Department of Natural Resources, Salt Lake City, Technical Publication No 52, 1976. 45 p, 12 fig, 2 tab, 3 ref.

Descriptors: *Seepage, *Canal seepage, *Water loss, *Return flow, *Groundwater movement, Percolation, Gradients(Streams), Flow measurement, *Utah.
Identifiers: Beaver County(Utah), Water gains, *Beaver River Valley(Utah).

A study of water gains or losses of nine canals near Beaver, Utah, was made to aid in the water allocation of the canal systems. The canals included are Manderfield Ditch, Last Chance Canal, Christiansen Ditch, Mammoth Canal, City Ditch, Owens Ditch, South Field Ditch, Patterson Ditch, and Aberdare Canal. Four sets of seepage measurements were made during 1974, but flow was observed in all nine canals only during the set of measurements made in June. Adjustments for fluctuations in flow in the canals were made from information obtained from water-stage recorders operated at selected locations along the canals during the time of each seepage run. The canals studied in Beaver Valley have small to moderate gains or losses. The total average loss for all nongaining reaches, which have an aggregate length of 21.2 miles, was 4.8 cfs (cubic feet per second). During the seepage runs and average total of 200.6 cfs entered the nongaining reaches. The gaining reaches have an aggregate length of 4.1 miles. Most of the water that is lost from canals reappears in lower canals or the Beaver River and its tributaries. (Woodard-USGS)
W77-03880

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 6B.
W77-03883

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 7C.
W77-03885

MAGNITUDE AND FREQUENCY OF FLOODS IN NEBRASKA,
Geological Survey, Lincoln, Nebr. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-03886

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-03890

RESERVOIR-SYSTEM MODEL FOR THE WILLAMETTE RIVER BASIN, OREGON,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-03891

HYDROLOGIC UNIT MAP--1974, STATE OF COLORADO.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W77-03893

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
A. L. Knight.
Alabama Geological Survey, University, Map 167, 1976. 31 p, 5 fig, 2 plates, 5 tab, 22 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Water quality, *Hydrologic data, Streamflow, Flow rates, Aquifer characteristics, Water yield, Water levels, Available water.
Identifiers: *Jefferson County(Ala).

The average annual precipitation in Jefferson County, Alabama, is about 53 inches or about 2,820 mgd (million gallons per day). About 1,130 mgd runs off directly into streams, and the remaining 1,690 mgd replenishes soil moisture to underground reservoirs. Potential sources of ground water are limestone, dolomite, sandstone, and chert aquifers. Wells developed in these aquifers may produce as much as 0.5 mgd per well. In some areas, wells developed in the limestone, dolomite, and chert aquifers may produce more than 0.5 mgd per well. Water from the limestone and dolomite aquifers generally is moderately hard to very hard, contains less than 0.3 mg/liter iron, and has a median value of 150 mg/liter dissolved solids. Water from the sandstone aquifer generally is soft to moderately hard, contains iron in excess of 0.3 mg/liter, and has a median value of 210 mg/liter dissolved solids. Potential sources of surface water in Jefferson County are the Black Warrior and Cahaba Rivers, Locust Fork, and Valley, Village, Fivemile, Shades, and Turkey Creeks. Average flows at the mouth of these streams or at the point where the stream leaves the county are 4,070, 250, 1,230, 360, 100, 120, 100, and 90 mdg. (Woodard-USGS)
W77-03894

MODEL UNCERTAINTY IN FLOOD FREQUENCY ANALYSIS AND FREQUENCY-BASED DESIGN,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
B. Bodo, and T. E. Unny.
Water Resources Research, Vol. 12, No. 6, p 1109-1117, December 1976. 8 fig, 6 tab, 21 ref.

Descriptors: *Water resources, *Flood frequency, *Flood control, *Decision making, *Analytical techniques, *Probability, Economics, Optimization, Flood plains, Statistical methods, Arizona, Equations, Mathematical models, Systems analysis.
Identifiers: *Uncertainty, *Bayesian methods, Likelihood function, Bayesian inference, Benefit maximization.

Constrained by computational feasibility, attempts to describe random natural pnenomena of complex origin analytically can lead to a multiplicity of simplistic potentially representative model forms, as has occurred in the case of flood frequency analysis. Classical statistical methods inadequately confront this model uncertainty. Likelihood and Bayesian methods are presented and shown to permit inference concerning the relative goodness of several potential model candidates with respect to a given set of flood events. The Bayesian inferences are further combined within a decision theoretic structure for examining the anticipated economic consequences of model uncertainty regarding decisions concerning flood protection levels. The objective of the decision analysis is to determine that alternative which maximizes the expected utility or benefit. For illustrative purposes, the method has been applied to the decision analysis of flood protection design for the Rillito Creek floodplain in Arizona. Results of this paper show that Bayesian methods supply more precise infromation but require greater effort. Since a model world of simplistic forms may never be defined absolutely, both decision and inference remain subject to the astute judgment of the analyst. (Bell-Cornell)
W77-03940

MULTIPURPOSE DEVELOPMENT ON THE TISZA RIVER.
Water Power, Vol. 26, No. 3, p. 102-103, 1974. 5 fig.

Descriptors: *Foreign projects, *Dams, *Multiple-purpose projects, *River basin development, Comprehensive planning, Potential water supply, Transportation, Navigable rivers, Impoundments, Powerplants, Hydroelectric plants, Engineering structures, Multiple-purpose reservoirs, Europe, Irrigation.
Identifiers: *Tisza River(Hungary), Barrages, Kiskore(Hungary).

A new dam across Hungary's Tisza River, one of four projected barrages on the river scheduled for completion by the end of the century, will turn a 25-mile stretch of the waterway into a three-mile-wide impoundment and will raise the water level 15-30 feet. The barrage, recently opened near the village of Kiskore in eastern Hungary, consists of three main parts--the dam itself, the sluice gates and a power station which will have an eventual capacity of 28 MW and will generate 106 GWh of electricity each year. The impoundment will be filled in two stages. The first and lower part will provide 100 million cubic meters of water, and the eventual capacity will be four times that amount. The new dam will ultimately provide irrigation for 700,000 acres of arid land in the Hungarian agricultural plain. The dam has made an additional 75 miles of the river navigable all year-around, including what were some of the shallowest reaches; total goods transported each year is thereby expected to increase from 150,000 to 4.2 million tons. Three irrigation networks branching out from Kiskore will provide water for 500 large-scale cooperative and state farms, affecting about 1,000 villages and hamlets. (Harris-Wisconsin)
W77-03957

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, SEVENTH VOLUME.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6A.
W77-03967

LEGAL PROBLEMS IN CHANGING USES OR COORDINATING USES OF KEYHOLE RESERVOIR,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 6E.
W77-03973

CONTROL OF FJORDIC DEEP WATER RENEWAL BY RUNOFF MODIFICATION,
Dunstaffnage Marine Research Lab., Oban (Scotland).
For primary bibliographic entry see Field 2L.
W77-03975

CHANGE IN SOME ELEMENTS OF THE RIVER REGIME IN THE LOWER OB' REGION UPON FLOW REGULATION (IN RELATION TO THE REDISTRIBUTION OF WATER RESOURCES IN THE CENTRAL REGION),
Akademiya Nauk SSSR Moscow. Institut Geografii.
L. K. Malik.
Soviet Hydrology, Selected Papers, No. 2, p 70-73, November 1975. 2 fig, 3 tab, 8 ref. Translated from Vestnik Moskovskogo Universiteta, Geografiya, No. 1, p 70-76, 1975.

Descriptors: *Rivers, *Backwater, *Water levels, Runoff, Foreign countries, Foreign research, Dams, Regulated flow, River regulation, Groundwater, Infiltration, Bogs, Forecasting, Model studies.
Identifiers: *USSR, *Siberia, *Ob' River(USSR).

The planned diversion of part of the runoff of West Siberian rivers to the south requires that hydrologists forecast the most important elements of the river regime which have an unfavorable effect on the development of natural processes in excessively wet regions. Backwater is one of those unfavorable elements. Hydrologists dealing with Siberia have given their attention to this problem because of the necessity of determining the chain of factor, including hydrologic, causing rapid bog development in West Siberia; and, also, because of the planning of the Lower Ob' hydroelectric power station, whose construction will produce continuous backwater along tributaries. The need to forecast the changes in natural conditions in the Central Region, following the planned redistribution of runoff, required the development of special methods because of the limited information available on backwater in the rivers of the West Siberian plain, the development of special methods for computing the parameters of backwater zones for this region and for determining their relation with backwater-producing factors. Using the newly developed method, according to which backwater zones are determined as a function of the amplitude of the stages in the main backing-up rivers and of the low-flow slopes of the rivers being backed up, computations were made for the characteristics of the backwater zones of 13 tributaries of the Lower Ob' (second-order rivers) and of the Lesser Sos'va (third-order river), a tributary of the Northern Sos'va. The computations were made for the period of maximum flood stages in the main backing-up rivers (Ob' and Northern Sos'va) from the data for 1966, which was a high-flow year over most of the region, and from long-period mean data. (Sims-ISWS)
W77-03989

MULTIVARIABLE FLOOD LEVEL FREQUENCY DISTRIBUTIONS,
Dillon (M. M.), Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 8B.
W77-03996

LEAST COST CONTROL STRATEGIES IN URBAN DRAINAGE DESIGN -- A DYNAMIC PROGRAMMING APPROACH,
Washington Univ., Seattle. Dept. of Civil Engineering.
S. Froise.
Technical Report No. 46 University of Washington, College of Engineering. *Charles W. Harris Hydraulics Laboratory. Department of Civil Engineering, Seattle, November 1975. 166 p, 31 fig, 8 tab, 107 ref, append.

Descriptors: *Urban drainage, *Networks, *Dynamic programming, Storage, Conveyance structures, Optimization, Simulation analysis, Costs, Estimating, Digital computers, Hydraulic models, Methodology, Equations, Mathematical models, Systems analysis, Design.
Identifiers: *Cost minimization.

An approach to determine least cost control strategies in urban drainage network design has been developed. The networks are defined as cominations of conveyance and storage elements, where the conveyance elements are circular cross-section conduits, junction and diversion structures and pump stations. The storage basins are ponds and retention basins of different configurations. With network layouts established through a preliminary planning process, it is postulated that a unique least-cost combination exists of conveyance and storage elements to each identified network alternative. The problem is formulated as an N-stage sequential process using dynamic programming to determine at least cost solution. The dynamic programming approach is coupled with hydraulic simulation and cost-estimation models and is structured to handle serial and converging networks, and is shown to converge to the global optimum. The model is programmed in FORTRAN IV and has been implemented on a digital computer. The hydraulic model consists of a design module and a simulation module. It is concluded that significant cost reductions can be achieved using these methodologies. (Bell-Cornell)
W77-04007

APPLICATION OF GAME THEORY IN WATER MANAGEMENT,
Water Resources Center, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W77-04009

4B. Groundwater Management

A SUBSURFACE STUDY OF THE MESA GEOTHERMAL ANOMALY, IMPERIAL VALLEY, CALIFORNIA,
Colorado Univ., Boulder. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2F.
W77-03771

IDENTIFICATION OF GASOLINE CONTAMINATION OF GROUNDWATER BY GAS CHROMATOGRAPHY,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
For primary bibliographic entry see Field 5A.
W77-03796

ANALYTIC SOLUTIONS FOR DRAWDOWNS IN RECTANGULAR ARTESIAN AQUIFERS,
Birmingham Univ. (England). Dept. of Civil Engineering.
Y. K. Chan, N. Mullineux, and J. R. Reed.
Journal of Hydrology, Vol. 31, No. 1/2, p 151-160, September 1976. 1 fig, 1 tab, 6 ref, 2 append.

Descriptors: *Equations, *Drawdown, *Artesian aquifers, Groundwater, Pumping, Wells, Boundaries(Surfaces), Homogeneity, Potentiometric level, Numerical analysis, Steady flow, Observation wells, Mathematical models.
Identifiers: *Integral transforms, Images, Rectangular aquifers, Hyperbolic functions, Convergence.

Analytical solutions for the drawdowns due to a single well pumping at a constant rate from a rectangular homogeneous artesian aquifer were obtained using the method of integral transforms for a variety of boundary conditions. The computational effort was shown to be small in comparison with that needed in employing the method of images. The method can be used in problems in which the method of images fails. (Visocky-ISWS)
W77-03854

HYDROLOGY OF THE SOLID WASTE BURIAL GROUND, AS RELATED TO THE POTENTIAL MIGRATION OF RADIONUCLIDES, IDAHO NATIONAL ENGINEERING LABORATORY,
Geological Survey, Boise, Idaho. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03874

SUMMARY APPRAISALS OF THE NATION'S GROUND-WATER RESOURCES--ARKANSAS-WHITE-RED REGION,
Geological Survey, Lakewood, Colo. Water Resources Div.
M. S. Bedinger, and R. T. Sniegocki.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $0.85. Professional Paper 813-H, 1976. 31 p, 21 fig, 5 tab, 77 ref.

Descriptors: *Groundwater resources, *Central US, *Evaluation, *Regional analysis, *Available water, Water demand, Water utilization, Aquifer characteristics, Hydrogeology, Water wells, Water yield, Climates, Semiarid climates, Colorado, Kansas, Oklahoma, Texas.
Identifiers: *Arkansas-White-Red Region.

The Arkansas-White-Red Region, an area of 265,000 square miles is characterized by diversity in geography, climate, and geology and, in turn, by diversity in water resources and water problems. The western semiarid part of the region is water deficient, that is, potential evapotranspiration exceeds precipitation. The eastern, humid part has a surplus. Water use in the region in 1970 averaged 10 billion gallons per day, of which more than 65 percent was ground water. The largest use of ground water was for irrigation of crops, mostly in the water-deficient areas of Texas, Oklahoma, Kansas, and Colorado. Because of its ready availability and widespread occurrence, ground water is used throughout the region to supply municipal and rural water needs. The most productive aquifers, capable of yielding more than 50 gallons per minute to individual wells are alluvium, carbonate rocks, gypsum, and sandstone. Fresh water in storage in aquifers in the region is estimated to be 2 billion acre-feet. In addition, a large unmeasured volume of saline water (containing more than 1,000 mg/liter of dissolved solids) underlies the fresh water at depths generally less than 500 feet. (Woodard-USGS)
W77-03877

GROUND-WATER RESOURCES OF THE HOLLOMAN AIR FORCE BASE WELL-FIELD AREA, 1967, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex. Water Resources Div.
W. C. Ballance, and R. Mattick.
Open-file report 76-807, November 1976. 90 p, 15 fig, 7 tab, 6 ref.

Descriptors: *Groundwater resources, *Overdraft, *Drawdown, *Withdrawal, *Saline water intrusion, Water utilization, Water quality, Water supply, Military reservations, *New Mexico, Evaluation, Projections.
Identifiers: *Holloman Air Force Base(N Mex).

Water consumption at Holloman Air Force Base (HAFB), N. Mex., reached an all time high in 1964 and 1965. Further increases in withdrawal without expansion of pumping facilities will hasten the chemical deterioration of the ground water pumped from the well fields. Saline water in the well-field area is present on the north and west sides of the potable-water area and in a thin shallow zone that overlies the potable-water sands in part of the potable-water area. The latter source is affecting quality of the water produced from most wells. The saturated thickness of material underlying the Boles well field ranges from about 3,500 feet in the western part of the field to about 1,200 feet in the eastern part of the field. In the Douglass and San Andres well fields, the saturated thickness ranges from 3,500 feet to about 300 feet. Expansion of the Boles and San Andres well fields

to the east and southeast would move the center of pumping away from the highly saline water to the north and west. This would eliminate overpumping of the present wells that has resulted from the expanded facilities at Holloman Air Force Base. (Woodard-USGS)
W77-03878

ABATEMENT OF NITRATE POLLUTION IN A PUBLIC-SUPPLY WELL BY ANALYSIS OF HYDROLOGIC CHARACTERISTICS,
Geological Survey, Laguna Niguel, Calif.
For primary bibliographic entry see Field 5G.
W77-03879

PRELIMINARY DIGITAL MODEL OF GROUND-WATER FLOW IN THE MADISON GROUP, POWEDER RIVER BASIN AND ADJACENT AREAS, WYOMING, MONTANA, SOUTH DAKOTA, NORTH DAKOTA, AND NEBRASKA,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 2F.
W77-03882

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 6B.
W77-03883

INTRODUCTION TO GROUND-WATER HYDRAULICS--A PROGRAMED TEXT FOR SELF-INSTRUCTION,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 8B.
W77-03884

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 7C.
W77-03885

DISTRIBUTION AND TREND OF NITRATE, CHLORIDE, AND TOTAL SOLIDS IN WATER IN THE MAGOTHY AQUIFER IN SOUTHEAST NASSAU COUNTY, NEW YORK, FROM THE 1950'S THROUGH 1973,
Geological Survey, Mineola, N.Y. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03887

GROUND-WATER LEVELS IN WYOMING, 1975,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
W. C. Ballance, and P. B. Freudenthal.
Open-file report 76-598, July 1976. 170 p, 21 fig, 4 ref.

Descriptors: *Groundwater resources, *Water level fluctuations, *Observation wells, *Aquifers, *Wyoming, Water utilization, Irrigation, Municipal water, *Basic data collections, Hydrographs.

Ground-water levels are measured periodically in a network of about 260 observation wells in Wyoming to record changes in ground-water storage. The areas of water-level observation are mostly where ground water is used in large quantities for irrigation or municipal purposes. This report contains maps showing location of observation wells and water-level changes from 1975 to 1976. Well history, highest and lowest water levels, and hydrographs for most wells also are included. (Woodard-USGS)
W77-03888

GROUND-WATER RESOURCES AND GEOLOGY OF JEFFERSON COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
R. G. Borman, and L. C. Trotta.
Wisconsin Geological and Natural History Survey, Madison, Information Circular No 33, 1975. 31 p, 16 fig, 1 plate, 2 tab, 20 ref.

Descriptors: *Groundwater resources, *Water supply, *Water quality, *Water utilization, *Wisconsin, Aquifer characteristics, Pumping, Water yield, Hydrogeology, Water table, Groundwater movement, Groundwater recharge, Hydraulic conductivity.
Identifiers: Jefferson County(Wis).

A steadily increasing population in Jefferson County, Wisconsin, is expanding the need for ground-water supply. Good-quality water is available from the sand-and-gravel, Galena-Platteville, and sandstone aquifers. As much as 15 gpm (gallons per minute) can be obtained from wells almost everywhere in the county. Yields of more than 1,000 gpm are available from glacial drift where it contains a sufficient thickness of saturated sand and gravel. The Galena-Platteville aquifer is a dolomite that occurs mainly in the eastern one-half of the county and is locally more than 300 feet thick. Estimated well yields from this aquifer exceed 500 gpm. The sandstone aquifer underlies nearly the entire county except for small areas in the northwest corner. It is more than 1,100 feet thick in the southwest along the Dane-Jefferson County line. This aquifer is capable of yielding more than 1,000 gpm. The chemical quality of water from the three aquifers is similar. The water has a median hardness between 315 and 325 mg/liter. Median values for dissolved solids range between 325 and 349 mg/liter. Combined iron and manganese commonly exceed 0.3 mg/liter. About 13.0 gpm of ground water was pumped in the county in 1972, 87 percent from the sandstone aquifer. About 62 percent of the total water pumped was for industrial and commercial purposes, 26 percent for residential use, and 12 percent for municipal, irrigation, and institutional use. (Woodard-USGS)
W77-03889

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-03890

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03894

GROUND WATER MANAGEMENT AND SURFACE WATER DEVELOPMENT FOR IRRIGATION,
Montana State Univ., Bozeman.
O. R. Burt.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 75-95. 22 ref, 1 append.

Descriptors: *Groundwater, *Management, *Surface waters, *Irrigation, *Water resources development, *Dynamic programming, Aquifers, Methodology, Economics, Evaluation, Timing, Water delivery, Optimization, Water allocation(Policy), Conjunctive use, Hydrological aspects, Investment, Equations, Mathematical models, Systems analysis.
Identifiers: Equilibrium state, Iterative procedure, Decision rule, Benefit maximization.

In many groundwater basins, the timing of surface water development and the locations at which water is delivered are economically intertwined with intertemporal allocation of groundwater stocks. Herein, these dependencies are analyzed, a quantitative economic framework is developed, and a general model for optimal intertemporal allocation of groundwater among several hydrologically interconnected aquifers is presented. Used in conjuction with simulation analysis, this model exploits the notion of approximately optimal decision rules obtained by a truncated Taylor's series approximation to the associated functional equation of dynamic programming. This approximation is reasonably accurate, since rate of change in groundwater stocks is relatively small in relation to the size of stocks and because of the influence of an economic discount factor. It is hoped that the simplifications proferred for the intertemporal allocation problem will make it feasible to evaluate a large number of different surface water systems for conjunctive use of ground and surface water and to evaluate the timing of delivery for surface water. The optimization criterion herein is benefit maximization. (See also W77-03924) (Bell-Cornell)
W77-03929

GEOTHERMAL TECHNOECOSYSTEMS AND WATER CYCLES IN ARID LANDS,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 6G.
W77-03966

THE APPLICATION OF BOREHOLE GEOPHYSICS TO THE SELECTION AND MONITORING OF NUCLEAR WASTE DISPOSAL SITES,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5E.
W77-03970

CHANGE IN SOME ELEMENTS OF THE RIVER REGIME IN THE LOWER OB' REGION UPON FLOW REGULATION (IN RELATION TO THE REDISTRIBUTION OF WATER RESOURCES IN THE CENTRAL REGION),
Akademiya Nauk SSSR Moscow. Institut Geografii.
For primary bibliographic entry see Field 4A.
W77-03989

EARTHQUAKE-RELATED CHANGE OF THE HYDROGEN ION CONCENTRATION (PH) IN GROUND WATERS,
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Seismologii.
For primary bibliographic entry see Field 2K.
W77-03990

GROUND-WATER POLLUTION NEAR A LANDFILL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-03991

PUMPING OF AQUIFER WITH VISCOELASTIC PROPERTIES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
W. Brutsaert, and M. Y. Corapcioglu.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY11, Proceedings Paper No 12541, p 1663-1675, November 1976. 1 fig, 40 ref, 2 append.

Descriptors: *Consolidation, *Aquifer characteristics, *Theoretical analysis, *Soil physical properties, Aquifers, Groundwater, Pore pressure, Subsidence, Analysis, Soil mechanics, Mechanical properties, Stress, Strain, Porous media.

Identifiers: *Confined aquifers, *Viscoelasticity, Rheological properties.

The land subsidence and the piezometric drawdown resulting from fluid withdrawal from a confined aquifer system were analyzed. The aquifer material was assumed to behave as a viscoelastic Merchant body, representing both primary and secondary consolidation. The resulting groundwater flow equation was solved for the problem of unsteady radial flow in an extensive confined aquifer of uniform thickness to a single fully penetrating well, pumped at a steady rate of flow. Comparison of the result for the special case of an elastic aquifer with the Theis solution indicated that for most practical situations, the obtained solution should yield good results. The parameters of the model, which are the hydraulic conductivity and the compressibilities of primary and secondary consolidation, respectively, and the viscosity of the secondary consolidation, can be derived from records of piezometric drawdown and surface compaction. (Adams-ISWS)
W77-03995

UNSATURATED ZONE AND VERTICAL-FLOW COMPONENTS IN DRAINING UNCONFINED FORMATIONS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W77-04000

4C. Effects On Water Of Man's Non-Water Activities

SOIL MOISTURE RESPONSE TO SEVERAL LEVELS OF FOLIAGE REMOVAL ON TWO UTAH RANGES,
Oregon State Univ., Corvallis. Rangeland Resources Program.
For primary bibliographic entry see Field 2G.
W77-03629

DESERTIFICATION: SYMPTOM OF A CRISIS,
International Center for Arid and Semi-Arid Land Studies, Lubbock, Tex.
H. E. Dregne.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-Arid Natural Resources Program seminar papers, University of Arizona, p 12-24, Sept. 1976. 6 fig.

Descriptors: *Deserts, *Arid lands, *Land management, Planning, Dry farming, Crop production, Soil-water-plant relationships, Impact(Rainfall), Economic efficiency, Human population, Drought.
Identifiers: *Desertification.

The impacts of desertification on arid lands are discussed and ways of combatting the process, especially in economically poor nations, are outlined. Desertification is defined as a process of impoverishment of arid, semiarid and some subhumid ecosystems due to human activities and drought. Effects include reduced productivity of desirable plants, accelerated soil deterioration, and increased dangers for human occupation. Man's impact is the result of overpopulation and poor management of natural resources. Relatively poor nations are counseled to adopt a program of selective development in dryland and irrigated areas, one effect of which is increased crop production. The components of such a program include political commitment, rehabilitation of favorable areas, development of small-scale (cottage) agriculture-based industries, and improvement of the nation's economic and educational base. (Jahns-Arizona)
W77-03737

THE CONSEQUENCES OF FOOLING MOTHER NATURE,
Arizona Univ. Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 2B.
W77-03738

ATMOSPHERIC DUST AND SURFACE ALBEDO: EFFECTS ON DESERTIFICATION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2D.
W77-03739

SEGMENTS OF A VICIOUS CIRCLE: LAND DEGRADATION AND WATER RESOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
W. G. Matlock.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-Arid Natural Resources Program Seminar papers, University of Arizona, p 45-50, September 1976.

Descriptors: *Arid lands, *Land management, *Erosion, *Water resources development, *Soil-water-Plant relationships, Vegetation effects, Runoff, Infiltration, Rainfall, Sediment yield, Groundwater recharge, Floods.
Identifiers: *Land degradation.

Land degradation entails some or all of the following processes: reduction and ultimate elimination of desert vegetation; increased runoff rate and decreased surface moisture infiltration; greater soil erosion, eventually with some loss of soil fertility; and formation of mobile sand dunes and desert pavement. Sediment movement and rainfall reduction due to vegetation loss are discussed. Runoff-infiltration-vegetation relationships are influenced by the amount of ground cover, interception of moisture by vegetation, and the nature of the surface layer. Badly eroded land has been reported to increase the sediment load to 5,000 tons per square mile per year, 20 times the North American average. Effects of this are described, including those on the process of reservoir filling, which is accelerated by larger sediment loads. Another problem is that of violent floods that become higher in peak flow and shorter in duration. Also, direct recharge to groundwater aquifers is reduced. Surface water development may change river regimes and lead to abandonment of irrigated land during periods of reduced rainfall. Lower water levels cause a decrease in vegetative cover, contributing to erosion and consequent reduced recharge, thus decreasing groundwater availability. (Jahns-Arizona).
W77-03740

DESERTIFICATION AND THE SALINITY PROBLEM IN AUSTRALIA,
University of New England, Armidale (Australia). Dept.of Geography.
I. Douglas.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-Arid Natural Resources Program seminar papers, University of Arizona, September 1976, p 87-106. 2 fig, 68 ref.

Descriptors: *Deserts, *Salinity, *Australia, *Land management, *Arid lands, Droughts, Sierozems, Saline soils, Land use, Hydrologic cycle, Saline water intrusion, Impact(Rainfall), Pasture management, Irrigation effects.
Identifiers: *Desertification.

Management of semiarid lands in Australia is difficult because of relict desert landforms and salt accumulations due to past climatic oscillations between wet and dry phases and because of the variability of the present-day climate. The extent of the arid zone was much greater in past dry periods; clearing and exploitation of land on present arid zone margins has altered the hydrologic cycle and may result in a return to those earlier dry conditions. The extent of the Australian arid zone is described, along with rainfall and soil characteristics, the impact of animals on the environment, pasture land use problems, irrigation impacts and other land developments. It is suggested that stabilized, vegetated dunes may become mobile, relict salt may reconcentrate to cause salt scalds, and erosion may strip surface soil and destroy the environment for good seed germination. The salinity problem is outlined, including its impact on agriculture. Almost all inland waters are dominated by sodium chloride; precipitation accounts for more salt in Australian rivers than in rivers elsewhere. (Jahns-Arizona).
W77-03741

DESERT REPAIRED IN SOUTHEASTERN OREGON: A CASE STUDY IN RANGE MANAGEMENT,
California Univ., Berkeley. Coll. of Natural Resources.
For primary bibliographic entry see Field 4D.
W77-03742

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
For primary bibliographic entry see Field 6F.
W77-03774

EFFECTS OF FOREST CULTURAL TREATMENTS UPON STREAMFLOW,
Forest Station (USDA). Ogden, Utah. Intermountain Forest and Range Experiment Station.
W. F. Megahan.
The Forest Acts Dilemma Symposium, p 14-34, 1975. Proceedings Montana Forest and Conservation Experiment Station, University of Montana, 1976.

Descriptors: *Forest management, *Streamflow, *Lumbering, *Water quality, Water yield, Watershed management, Trees, Consumptive use, Microclimatology, Soils, Forest soils, Soil environment, Moisture availability.

Silvicultural operations and tree felling and logging practices affect a number of streamflow properties, including total quantity, timing, and quality of flows. The effects of silvicultural practices upon streamflow result from modifications in watershed functions caused by reduced water use by trees, changes in the microclimate of the forest site following tree removal, and soil disturbance created by overall timber harvesting operations. (Witt-IPC)
W77-03795

A COMPARISON OF MODELING AND STATISTICAL EVALUATION OF HYDROLOGIC CHANGE,
Melbourne and Metropolitan Board of Works (Australia).
For primary bibliographic entry see Field 4D.
W77-03800

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W77-03826

EQUALIZATION OF FLOW VARIATIONS IN COMBINED SEWERS,
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Water Supply and Sewerage Engineering.
For primary bibliographic entry see Field 5D.
W77-03860

ALTERATION OF WATER REGULATING AND PROTECTIVE FEATURES OF THE FOREST UNDER INFLUENCE OF FORESTRY MEASURES, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Lesovodstva i Mekhanizatsii Lesnogo Khozyaistva, Pushkino (USSR).
A. V. Pobedinskii.
Lesovedenie 4, p 3-11, 1975.

Descriptors: *Forest management, *Clear-cutting, *Soil erosion, Flow, Regulation, Forest soils, Lumbering, Reforestation, Erosion control, Water conservation.
Identifiers: *USSR.

Forestry measures (cuttings, mechanized removal of wood, forest restoration), carried out without consideration of forest needs, lead to the increase of surface flow, erosion and reduction of soil fertility. Investigations in different areas of the USSR produced recommendations on the rational use of forest resources, preservation and intensification of water regulative and protective properties of the forest.--Copyright 1976, Biological Abstracts, Inc.
W77-04002

4D. Watershed Protection

RAINFALL EROSIVITY ANALYSIS OF SOIL CONSERVATION RESEARCH CENTRE, VASAD(GUJARAT),
Guiarat Soil Conservation Research, Demonstration and Training Centre, Vasad (India).
A. Singh, C. M. Shah, and H. K. Kamannavar.
Indian Forester, Vol. 102, No. 2, p. 126-132, February, 1976. 2 fig., 3 tab., 3 ref.

Descriptors: *Erosion control, *Rainfall *Soil erosion, *Erosion rates, *Rainfall intensity, Erosion, Precipitation(Atmospheric), Rainfall-Runoff relationships, Rain, Surface runoff, Accelerated erosion, Rain water, Vegetation establishment, Soil management, Mathematical models.
Identifiers: *India.

Erosivity has been defined as the potential ability of rain to cause erosion. Erosion rates and effects of erosion in the Gujarat state of India are discussed and evaluated. Since rainfall is the main cause of erosion in the area, knowledge of its patterns can serve as an aid to the design and planning of soil conservation operations. Studies have shown that erosion is almost entirely caused by rainfall of high intensity. Thus, the study was confined only to those months receiving high intensity rainfall--June through September. There are two peak periods of intense rainfall. The first period attains its highest peak within a short period of two weeks in June and declines down to the minimum in the second week in August. Thus, the latter half of June is a crucial period of erosion hazard and land must be kept under cover as much as possible. A second peak period of intense rainfall begins in the third week of August and lasts for one month. The period between the two peak periods, from mid-July to mid-August is an important one for the application of vegetative control for soil conservation (Jamail-Arizona)
W77-03627

FRYINGPAN--ARKANSAS PROJECT COLORADO, FINAL ENVIRONMENTAL STATEMENT,
Bureau of Reclamation, Washington, D. C
For primary bibliographic entry see Field 8A.
W77-03702

THE APPLICATION OF HYMO TO STUDY AREAS OF SOUTHWESTERN WYOMING FOR SURFACE RUNOFF AND SOIL LOSS ESTIMATES,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 4A.
W77-03729

SEGMENTS OF A VICIOUS CIRCLE: LAND DEGRADATION AND WATER RESOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 4C.
W77-03740

DESERT REPAIRED IN SOUTHEASTERN OREGON: A CASE STUDY IN RANGE MANAGEMENT,
California Univ., Berkeley. Coll. of Natural Resources.
H. F. Heady, and J. W. Bartolome.
In: Desertification: Process, Problems, Perspectives, Arid/Semi-Arid Natural Resources Program seminar papers, University of Arizona, p 107-117, Sept. 1976. 6 fig.

Descriptors: *Arid lands, *Oregon, *Range management, *Land reclamation, Livestock, Vegetation regrowth, Erosion control, Deserts.

A large-scale rangeland rehabilitation project in the Vale, Oregon, District of the Bureau of Land Management as example of successful repair of deteriorated rangeland. Characteristics of the area, is described grazing history and changes in ground cover are discussed, and the development of a rehabilitation program is outlined. The program included land treatment (by plow and seed, spray, wildfire rehabilitation, etc.) in only 10% of the district and improved livestock management. Benefits include a doubled grazing capacity, maintenance of ground cover and accumulation of plant litter on the soil surface, and consequent lack of erosion. Bluebunch wheatgrass and other native perennials have increased in density; a diversity of vegetation was encouraged. There has been a lower rate of erosion and sedimentation into the Owyhee Reservoir. (Jahns-Arizona).
W77-03742

A COMPARISON OF MODELING AND STATISTICAL EVALUATION OF HYDROLOGIC CHANGE,
Melbourne and Metropolitan Board of Works (Australia).
K. J. Langford, and J. L. McGuinness.
Water Resources Research, Vol. 12, No. 6, p 1322-1324, December, 1976. 1 fig, 12 ref.

Descriptors: *Forest management, *Watersheds(Basins), Hydrology, *Statistical models, *Model studies, Mathematical models, Reforestation, *Watershed management, Lumbering, Surface runoff, Water yield, Runoff, Vegetation effects.

The U.S. Department of Agriculture Hydrography Laboratory model of watershed hydrology is adapted for use on a research watershed where land use changed drastically as a result of reforestation and subsequent thinning. Eight years of measured runoff from a mature forest are used to estimate two of the model parameters; the remaining 39 are based on physical measurements. Model simulations properly evaluated both the magnitude and statistical significance of the hydrologic changes with much fewer data than were needed for standard statistical analyses. (Witt-IPC)
W77-03800

LABORATORY TECHNIQUES IN THE PREDICTION OF SOIL ERODIBILITY,
California Univ., Davis. Dept. of Civil Engineering.
L. Harder, K. Arulanandan, P. Rabbon, R. Green, and M. Wahler.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 093, Price codes: A03 in paper copy, A01 in microfiche. Department of Civil Engineering, (1976). 29 p, 14 fig, 1 tab, 10 ref. (California Water Resources Center Project UCAL-WRC-W-502).

Descriptors: *Erosion, *Erosion rates, Dispersion, Laboratory tests, *Forecasting, *Soil erosion, *Shear stress, Rainfall simulators, Analytical techniques.
Identifiers: *Erosion predictions.

The purpose is to critically examine current laboratory techniques used in predicting erosion loss. Three bench mark soils have been selected and their engineering properties tested to yield parameters for this purpose. It was decided to investigate the shear stress required to initiate erosion and attempt to correlate results with Wischmeier's Soil Loss Equation. Other tests involved using Middleton's Dispersion Ratio, Free Swell Test, Dielectric Dispersion, and the Atterberg Limits in formulating erosion predictions. It is hoped later these test results can be evaluated by erosion measurements performed on the soils through field study and through the utilization of a rainfall simulator. (Snyder-California, Davis)
W77-03827

AN EVALUATION OF SURFACE-MINE SPOILS AREA RESTORATION IN WYOMING USING RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03892

DETERMINING WATERSHED SUB-AREAS WITH PRINCIPAL COMPONENT ANALYSIS,
Tobacco Tax Council, Richmond, Va.
V. G. Chappell, Jr.
Water Resources Bulletin, Vol. 12, No. 6, p 1133-1139, December 1976. 1 fig, 3 tab, 7 ref.

Descriptors: *Water resources, *Watersheds(Basins), *River basins, *Statistical methods, *Social aspects, Effects, Economics, Regions, Analytical techniques, Tennessee, Equations, Systems analysis.
Identifiers: *Principal component analysis, *Socioeconomic changes, *Economic sub-regions, Multiple discriminant analysis.

The delineation of economic sub-regions enhances the study of socioeconomic changes that occur in river basin communities. Moreover, the determination of sub-regions exhibiting different rates of socioeconomic change allows for the application of more specific projections and analyses. Principal component analysis (PCA) is a statistical technique which may be used to derive a statistically valid, single-valued index of socioeconomic change from several socioeconomic variables. Herein, PCA is utilized to incorporate the effects of several such variables into an index of watershed socioeconomic change. Among the variables considered are rate of population change, change in total property tax, change in total payroll per capita, and change in median income of all families. The index is then used as a basis for delineating economic sub-areas within the Tennessee River Basin. PCA gives the researcher the capability to reduce the multiple dimensions of economic development into a single dimension which can be used as an index of socioeconomic change. (Bell-Cornell)
W77-04012

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

ON THE APPLICATION OF RADIOISOTOPE X-RAY FLUORESCENCE ANALYSIS FOR THE SOLUTION OF ENVIRONMENTAL AND INDUSTRIAL PROBLEMS,
Staaliches Forchungsinstitut Geochemisches, Bamberg (West Germany).
H. Meier, and E. Unger.
Journal of Radioanalytical Chemistry, Vol. 32, No. 2, p 413-445, 1976. 17 fig, 8 tab, 64 ref.

Descriptors: *Analytical techniques, *X-ray analysis, *Industrial wastes, *Water analysis, Air pollution, Oil wastes, Metals, *Pollutant identification, *X-ray fluorescence.
Identifiers: *Petrochemical wastes, Radioisotope x-ray analysis.

Radioisotope X-ray analysis was the subject of much interest because it is a portable and low cost analytical system. Equations were given from which methods applicable to environmental analysis and industrial processes could be derived. Methods were suggested which would be useful in analyzing air particles and polluted water. These included quantitative analysis of elements of interest in different matrices such as solutions, powders and bulk solids, as well as determination of detection limits in trace analysis. The low mass absorption coefficients of oils qualify them for analysis by this process. In engine oils, wear metals, such as iron, chromium, copper, and nickel may be measured. Additive elements in lubricating oils and the sulfur content in fuel oils can be determined. The latter application is important since there is often a need for rapid quantitative analysis of sulfur in petroleum products. This can be achieved down to a detection limit of 60 ppm. Further experimentation is needed to develop the possibilities of radioisotope X-ray fluorescence techniques in environmental and industrial applications. (Collins-FIRL)
W77-03612

CHARACTERISTICS OF EFFLUENTS FROM CONVENTIONAL AND OXYGEN BLEACHING SEQUENCES,
National Council for Air and Stream Improvement, Gainesville, Fla. Southern Research Center.
W. L. Carpenter, W. T. McKean, H. F. Berger, and I. Gellman.
Tappi, Vol. 59, No. 11, p 81-84, November, 1976. 6 tab, 6 ref.

Descriptors: *Pollutant identification, *Biochemical oxygen demand, *Chemical oxygen demand, *Biological treatment, *Color, Chlorides, Effluents, Bleaching wastes, Laboratory studies, *Waste water treatment.

The effluent characteristics from laboratory bleaching of softwood, hardwood kraft, and softwood sulfite pulps by conventional sequences, CEHDED and CEH, respectively, are compared with those from oxygen bleaching sequences OCEDED, OCED, COD, CODED, and D/COD, respectively. Bleached pulp was washed in the laboratory with calculated amounts of distilled water, and the water was analyzed. Color, chloride concentrations, biochemical oxygen demand (BOD), chemical oxygen demand (COD), alkalinity, acidity, and total, volatile, and fixed solids were compared. Major reductions in effluent color, BOD, COD, and chloride concentration can be realized by the selection of bleaching sequences recycling of an alkali-oxygen stage for chemical recovery. The reductions obtained ranged from 60 to 90%. The reductions depend on choice of sequence, initial pulp kappa number, and chemical charge required to produce a highly bleached pulp. The overall reductions for some of the analytes measured in the effluents paralleled earlier data. Only modest differences in loads were noted regarding regional pulp source. (Snyder-FIRL)
W77-03614

A NEW LABORATORY DEVICE FOR WASTE WATER ANALYSES (RESPIROMETER). PART II. MEASUREMENTS WITH BATCH OPERATION (UJ LABORATORIUMI SZENNYVISVIZSGALO KESZULEK (RESPIROMETER) II. RESZ. MERESEK SZAKASZOS UZEMMOD MELLETT),
W. Fleps.
Hidrologiai Kozlony, Vol. 56, No. 5, p 201-207, 1976. 7 fig, 1 tab, 3 ref.

Descriptors: *Analytical techniques, *Waste water treatment, *Monitoring, *Biochemical oxygen demand, *Nutrients, Biodegradation, Efficiencies, Toxicity, Measurement, *Pollutant identification, Respiration.
Identifiers: *Respirometers.

A respirator device for making waste water measurements in batch operation is described. The respirometer is capable of determining biodegradability, toxicity, nutrient demand, total biochemical oxygen demand, and the probable efficiency of treatment. The device also allows for a determination of the carbon and oxygen balance of degradation. (See also W75-05398) (Kreager-FIRL)
W77-03621

HEAVY METAL POLLUTANTS IN THE SEDIMENTS OF THE RHONE RIVER,
Geneva Univ. (Switzerland). Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W77-03651

SULPHIDE MEASUREMENT USING AMMONIUM MOLYBDATE,
Ontario Ministry of the Environment, Toronto. Sediment and Biomaterials Lab.
F. C. Darcel, and M. S. Ali.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-7-II-12, 3 fig, 1 tab, 5 ref.

Descriptors: *Analytical techniques, *Sulfides, Hydrogen sulfide, Waste water(Pollution), Waste water treatment, Industrial wastes, *Pollutant identification, Measurement.

A technique for sulphide measurement is discussed, in which the sample is acidified and the hydrogen sulphide released is displaced in acidified ammonium molybdate. A blue color is produced, the intensity of which is proportional to sulphide concentration. The system is capable of analyzing from 0.5 to 1000 micrograms sulphide as hydrogen sulphide in a wide range of natural waters and industrial wastes. The detection limit is routinely 0.02 ppm but this can be lowered to 0.002 ppm by increasing aliquot sizes. (See also W77-03642) (Chilton-ORNL)
W77-03657

ADSORPTION OF C14-DDT TO PARTICLE SURFACES,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 5B.
W77-03658

MICROANALYSE DE L'INCORPORATION D'UN METAL LOURD DANS LES ECAILLES D'UN POISSON,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
R. Van Coillie, R. Lapointe, A. Rousseau, and J. L. Sasseville.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-41-II-45, 2 tab, 13 ref.

Descriptors: *Analytical techniques, *Heavy metals, Fish, Cadmium, *X-ray analysis, *Pollutant identification.
Identifiers: Fish scales, *Microanalysis.

X-ray microanalysis as a technique for detecting metals present in fish scales is discussed. Results using this technique have been comparable to results using other known techniques. Use of the microanalysis method showed that in Carassius auratus, cadmium partially replaces Ca, Mg, Na and K in the scales when the fish remains in water containing 50 ppb of Cd. Replacement time was found to be 6-8 hours. The quantity of Cd absorbed and Ca, Mg, Na and K replaced was found to be limited. (See also W77-03642) (Chilton-ORNL)
W77-03663

THE FORM OF MERCURY IN FRESHWATER FISH,
Ontario Ministry of the Environment, Toronto. Inorganic Trace Contaminants Lab.
J. N. Bishop, and B. P. Neary.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-25-III-29, 4 fig, 2 tab, 25 ref.

Descriptors: Environmental effects, *Water pollution effects, *Mercury, Fish, Organic compounds, Freshwater fish, Pollutant identification.
Identifiers: *Methyl mercury.

The analytical data reported in this study were drawn from a group of approximately 600 fish representing 16 species. For the 16 species examined, the average methyl mercury to total mercury ratio ranged from about 82% to 95%. This value supports other research showing that essentially all of the mercury present in fish muscle is in the methyl form. The proportion of mercury present as methyl mercury was found to be independent of fish age, weight, length, or species. (See also W77-03642) (Chilton-ORNL)
W77-03673

WATER RESOURCES DATA SYSTEM,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W77-03728

THE USE OF XAD-2 RESIN FOR THE ANALYSIS OF COPROSTANOL IN WATER,
Massachusetts Univ., Waltham. Dept. of Environmental Sciences.
C. K. Wun, R. W. Walker, and W. Litsky.
Water Research, Vol. 10, No. 11, p 955-959, 1976. 5 tab, 18 ref.

Descriptors: *Resins, *Coliforms, *Pathogenic bacteria, *Water pollution, *Analytical techniques, Bacteria, Sewage bacteria, Water pollution sources, Analysis, Water quality, Water analysis, Gas chromatography, *Pollutant identification, Chemistry, Instrumentation, Hydrogen ion concentration, Organic matter, Flow rates.
Identifiers: *Coprostanol, *XAD-2 resin, *Fecal coliform, *Coliform bacteria, *Fecal sterols, Resin column, Fecal pollution, Coliform organisms, Coliform tests, Public water supplies, Sterols, Organic contaminants, Hexane extraction, Resin mess size.

The use of Amberlite XAD-2 resin column for extracting 5 beta-cholestan-3 beta-ol (coprostanol), a fecal sterol, from water was studied. It was found

that the efficiency of the column extraction was comparable to that of the conventional liquid-liquid partitioning process. Maximum recovery from water samples depended upon pH of the sample, flow rate, resin mesh size, and concentration of coprostanol. The data suggest that the use of Amberlite XAD-2 resin columns for the quantitation of coprostanol may be employed effectively to supplement the enumeration of coliform bacteria as an indicator of fecal pollution of water. (Henley - ISWS)
W77-03767

ELECTRON CAPTURE GAS CHROMATOGRAPHIC METHODOLOGY FOR THE QUANTITATION OF POLYCHLORINATED BIPHENYLS: SURVEY AND COMPROMISE,
Canada Centre for Inland Waters, Burlington (Ontario).
A. S. Y. Chau, and R. C. J. Sampson.
Environmental Letters, Vol. 8, No. 2, p. 89-101, 1975. 2 fig., 7 tab., 10 ref.

Descriptors: *Analytical techniques, *Polychlorinated biphenyls, *Gas chromatography, Pesticide residues, Methodology, Aroclors, Laboratory tests, *Pollutant identification.
Identifiers: *Electron-capture gas chromatography.

An international survey of electron-capture gas chromatographic laboratory methods analyzing for PCBs indicated that a wide range of techniques and columns were employed resulting in considerable variation between chromatograms. The requirement for a reasonable compromise between accurate analysis and the ability to handle a large number of samples suggested the need for a uniform approach to quantitation of environmental PCB residues. Among the methods evaluated, it was determined that the Webb/McCall method best fulfills the survey objectives. By using the Aroclor composition tables prepared by Webb, the concentration of PCB represented by each gas chromatographic (GC) peak was determined from the product of mean weight percent PCB and total Aroclor concentration. Standard curves were prepared by plotting mean peak height against PCB concentration for each peak to investigate both the linearity of response of all the PCB GC peaks and the response of each peak in a particular PC 3 formulation relative to the same peaks in other preparations. The Webb method is more generally applicable to PCB analysis of residues from a wide variety of sources as it eliminates the mixed standards requirement; it will yield more realistic results in increasing complexity of the chromatogaram profile; and its underlying definitive logic and simplicity makes it more amenable to computerized data reduction methods. (Auen-Wisconsin)
W77-03779

SIMULTANEOUS DETERMINATION OF TOTAL, NON-CARBONATE AND CARBONATE WATER HARDNESS BY DIRECT POTENTIOMETRY,
Canada Centre for Insland Waters, Burlington (Ontario).
I. Sekerka, and J. F. Lechner.
Talanta, Vol. 22, p. 459-463, 1975. 3 fig., 2 tab., 15 ref.

Descriptors: *Analytical techniques, *Hardness(Water), *Computer programs, *Potentiometers, Calcium, Magnesium, Ions, *Carbonates, Data processing, Pollutant identification.

Various types of water hardness can be determined simultaneously by manual and automated direct potentiometry, using the bivalent ion-selective electrode and the known addition-known dilution technique. This automated and programmable system produces direct printout of total, non-carbonate and carbonate water hardness. Equipment and procedures used are detailed, with a block diagram showing equipment assembly. The on-line computer treatment of potentiometric measurements provides a printout in ppm of water hardness and eliminates additional graphic and mathematical operations. The computer program Algorithm and flow chart are given. On a single sample basis the manual procedure is at least 30 minutes shorter than the conventional method (20 and 50 minutes). The conventional serial analysis of 20 samples using simultaneous boiling, cooling and filtration of 20 samples plus successive measurements by titration takes about 100 minutes against 20 automated measurements at 3 minutes each for a total of 60 minutes. The manual procedure, with its inherent simplicy, inexpensiveness and speed, is most convenient for the analysis of small numbers of samples and in situ measurements, whereas the automated system improves the overall economy of serial analysis of large numbers of water samples. (Auen-Wisconsin)
W77-03780

GAS CHROMATOGRAPHIC DETERMINATION OF LOW CONCENTRATIONS OF HYDROCARBONS IN WATER BY VAPOR PHASE EXTRACTION,
Toronto Univ. (Ontario). Dept. of Chemical Engineering.
D. Mackay, W. Y. Shiu, and A. W. Wolkoff.
American Society for Testing and Materials Special Technical Publication 573, p. 251-258, 1975. 2 fig., 2 tab., 12 ref.

Descriptors: *Oil, *Analytical techniques, *Laboratory equipment, *Gas chromatography, Laboratory tests, Oil pollution, Instrumentation, *Pollutant identification, Organic compounds.
Identifiers: *Hydrocarbon measurement.

A laboratory appartus and method to determine low dissolved hydrocarbon concentrations and the thermodynamic basis for predicting the fraction of the hydrocarbon partitioning into the vapor phase is described. All parts of the equilibrium apparatus are of standard 316 stainless steel fittings. The ball valve has an orifice of 0.406 in. with a short length of 1/16-in. stainless steel tubing extended to the ball valve, which allows the upper chamber to be fully swept by carrier gas. The upper and lower chamber volumes are 18 cu and 100 cu cm, respectively. The apparatus is connected by 'Swagelock' Quick Connects to a Hewlett Packard Model 5750 Gas Chromatograph equipped with a flame ionization detector, and a heated gas sampling valve, modified by replacing one of the sample loops by two quick connectors which couple to the apparatus. It is important to ensure that there are no dead spaces in which some of the sample can be trapped. Sensitivity can be increased using larger volumes of water and improved accuracy can be obtained by increasing the number of calibrations. Reliable analyses are possible for alkanes down to 10 ppb and for toluene to 75 ppb. (Auen-Wisconsin)
W77-03781

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
C. W. Ohlhorst.
NASA Technical Memorandum X-3399, July 1976. 49 p. 21 fig., 8 tab., 3 ref. 176-30-31-01.

Descriptors: *Remote sensing, *Chlorophyll, *Suspended solids, *Spectrophotometry, Cameras, Estuaries, *Maryland, Measurement, Optical properties, Estuarine environment, Indicators, *Pollutant identification.
Identifiers: *Spectral filters, *Spectral bandwidths, *Patuxent River(Md).

Six broadband optical filters were flown over the Patuxent River (Maryland) in 1972 to evaluate their use in remotely measuring total chlorophyll-a and suspended solids concentrations, as part of a program to determine spectral bandwidths needed to measure remotely various water quality indicators. The spectral range of the Kodak Wratten 89B filter (690 to 900 nm) showed promise for detecting gross changes in total chlorophyll-a levels in estuarine waters. The filter-film system detected concentrations greater than 67 microgram/liter but did not detect concentrations lower than 28 microgram/liter. There was some indication that the 690 to 900 nm band can be used to measure suspended solids concentrations in the 20 to 70 mg/l range. The broad spectral bands of 500 to 600 nm (Wratten filters 57 and 58), 600 to 700 nm (Wratten filter 25), and 500-700 (Wratten filter 12) do not by themselves seem capable of measuring total chlorophyll-a levels below 28 microgram/liter in turbid waters. These spectral bands ranges do show some promise in measuring the concentration of total suspended solids in the range of 20-70 microgram/liter. The spectral band of 400-500 nm (Wratten filter 47B) shows no indication of being able to measure either total chlorophyll-a (less than 28 microgram/liter) or total suspended solids (20 to 70 microgram/liter range) in turbid estuaries. (Auen-Wisconsin)
W77-03785

DETERMINATION OF VOLATILE HALOGENATED HYDROCARBONS IN WATER BY GAS CHROMATOGRAPHY,
Canada Centre for Inland Waters, Burlington (Ontario).
K. L. E. Kaiser, and B. G. Oliver.
Analytical Chemistry, Vol. 48, No. 14, p 2207-2209, December, 1976. 4 fig, 15 ref, 1 tab.

Descriptors: *Water analysis, *Pollutant identification, *Chlorinated hydrocarbons, Halogens, Organic compounds, *Gas chromatography, Water pollution sources, Water properties, Water chemistry, Water pollution, Analytical techniques.
Identifiers: Chloroform, Carbon tetrachloride, *Halocarbons(Halogenated hydrocarbons).

A rapid method for the quantitative determination of volatile halognated hydrocarbons, such as chloroform, dichlorobromomethane, dibromochloromevethane, and carbon tetrachloride in water is described. This method is based on the equilibration of the dissolved compounds in water with a small volume of gaseous headspace under reduced pressure at elevated temperature. Headspace samples, so equilibrated, are directly injected into conventional gas chromatograph inlets for rapid quantification of the volatile compounds present. With a Ni-63 electron capture detector, quantitative determinations of chloroform and similar compounds in the 0.1 to 10 microgram/liter range in water samples of less than 60 ml are easily performed in about 45 minutes. Several equilibrations can be performed simultaneously without difficulty. (Witt-IPC)
W77-03787

DETERMINATION OF ARSENIC, TUNGSTEN, AND ANTIMONY IN NATURAL WATERS BY NEUTRON ACTIVATION AND INORGANIC ION EXCHANGE,
Los Alamos Scientific Lab., N. Mex.
E. S. Gladney, and J. W. Owens.
Analytical Chemistry, Vol. 48, No. 14, p 2220-2222, December, 1976. 28 ref, 4 tab.

Descriptors: *Water analysis, *Ion exchange, *Neutron activation analysis, *Arsenic compounds, Analytical techniques, Water pollution sources, Water chemistry, Water properties, Trace elements, Water quality, Separation techniques, *Pollutant identification.
Identifiers: *Tungsten, *Antimony, Aluminum oxide.

Ion-exchange on aluminum oxide columns has been used to quantitatively measure As, Sb, and W in water. This procedure requires short thermal neutron irradiations, rapid ion-exchange without chemical manipulations, and short gamma-ray counts on a Ge(Li) detector. Precisions of plus or minus 5% can be routinely obtained, and the following detection limits have been achieved: As, 0.05 ppb; Sb, 0.03 ppb; and W, 0.05 ppb. (Witt-IPC)
W77-03788

IDENTIFICATION OF 1,1,1-TRICHLOROACETONE (1,1,1-TRICHLOROPROPANONE) IN TWO DRINKING WATERS: A KNOWN PRECURSOR IN HALOFORM REACTION,
Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
I. H. Suffet, L. Brenner, and B. Silver.
Environmental Science and Technology, Vol. 10, No. 13, p 1273-1275, December, 1976. 2 fig, 10 ref, 1 tab.

Descriptors: *Potable water, *Water analysis, *Pollutant identification, Ion exchange, Gas chromatography, Spectroscopy, Water supply, Chlorination, Ammonification, Water purification, Water treatment, Water pollution sources, Water pollution, Water quality, Separation techniques, Chlorinated hydrocarbons, Organic compounds.
Identifiers: Trichloropropanone, Haloform reactions.

1,1,1-Trichloroacetone (1,1,1-trichloropropanone), a known precursor in the haloform reaction, was isolated from the drinking water of two different river water supplies, using an on-line XAD-2 macroreticular resin and a continuous liquid-liquid extractor. The water was adjusted to near pH 4 before it was passed through the XAD-2 resin. Gas chromatography/mass spectroscopy confirmation of the analysis is presented when free chlorination and/or ammoniation at two water supplies were practiced. (Witt-IPC)
W77-03794

IDENTIFICATION OF GASOLINE CONTAMINATION OF GROUNDWATER BY GAS CHROMATOGRAPHY,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
R. Dell'Acqua, B. Bush, and J. Egan.
Journal of Chromatography, Vol. 128, No. 2, p 271-280, December 8, 1976. 6 fig, 14 ref, 3 tab.

Descriptors: *Groundwater, *Gas chromatography, *Gasoline, *Pollutant identification, Fuels, Organic compounds, Water analysis, Water pollution sources, Analytical techniques, Chromatography, Water pollution.

Individual components that make up different grades of gasoline, or gasolines of the same grade produced by different manufacturers, are resolved and identified by gas chromatography using packed columns and a flame ionization detector. Contaminants at levels as low as 0.5 microliters/liter may be identified by the method if samples of gasoline from the source of contamination can be obtained for comparison. The method can be applied for routine analyses without the use of sophisticated complements for the gas chromatograph. (Witt-IPC)
W77-03796

AQUEOUS LEACHATE FROM WESTERN RED CEDAR: EFFECTS ON SOME AQUATIC ORGANISMS,
Washington Univ., Seattle, Coll. of Fisheries.
For primary bibliographic entry see Field 5C.
W77-03799

AN AUTOMATIC, CONTINUOUS, MODULAR WASTEWATER MONITORING SYSTEM,
NUS Corp., Rockville, Md. Enviromental Monitoring Systems Dept.
G. R. Goldgraben.
Instrument Society of America, Advances in Instrumentation, Annual Conference (Houston, Texas), Vol. 31, Part 3, Paper no. 720, 7 p, ISA (Pittsburgh), October 11-14, 1976. 4 fig, 8 ref.

Descriptors: *Monitoring, *Waste water(Pollution), Industrial wastes, *Pollutant identification, Data collections, Instrumentation, *Sampling, *Automation, Effluents.

The real-time characterization of industrial and other aqueous effluents is feasible with a completely automated integrated system engineered by NUS Corporation (Rockville, Maryland) which provides a flexible and reliable management tool for meeting legal and operational requirements. Selection of instrumentation and related options permit the configuration to be custom-tailored to the desired degree of automation. (Brown-IPC)
W77-03801

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W77-03826

RIVER AND COOLING WATER TEMPERATURE FLUCTUATIONS,
Minnesota Univ., Minneapolis. Dept. of Civil Engineering; and Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 5B.
W77-03834

AN INVESTIGATION INTO THE EFFECTS OF FORESTRY PLANTATIONS ON THE WATER QUALITY OF UPLAND RESERVOIRS IN NORTHERN IRELAND,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
For primary bibliographic entry see Field 5B.
W77-03840

ACCUMULATION AND DISTRIBUTION OF TOTAL MERCURY IN ESTUARINE SEDIMENTS,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia). Atlantic Geoscience Centre; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
For primary bibliographic entry see Field 5B.
W77-03857

ERTS-1, A NEW WINDOW ON OUR PLANET,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7B.
W77-03875

WASTE-ASSIMILATION STUDY OF KOSHKONONG CREEK BELOW SEWAGE-TREATMENT PLANT AT SUN PRAIRIE, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03876

GROUND-WATER RESOURCES OF THE HOLLOMAN AIR FORCE BASE WELL-FIELD AREA, 1967, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03878

CHEMICAL AND PHYSICAL DATA FOR THE FLAMING GORGE RESERVOIR AREA, UTAH AND WYOMING, 1973-75,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 7C.
W77-03881

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 6B.
W77-03883

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 7C.
W77-03885

GROUND-WATER RESOURCES AND GEOLOGY OF JEFFERSON COUNTY, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 4B.
W77-03889

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 6D.
W77-03890

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03894

ANALYSIS OF POLLUTION FROM MARINE ENGINES AND EFFECTS ON THE ENVIRONMENT. SOUTHERN LAKES,
Environmental Science and Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5C.
W77-03900

EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS ON ESTUARINE ORGANISMS - PHASE II,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W77-03901

CHEMICAL HAZARDS RESPONSE INFORMATION SYSTEM FOR MULTIMODAL ACCIDENTS (CHRISMA) (A REEVALUATION OF CHRIS FOR ALL MODES OF TRANSPORTATION),
Little (Arthur D.), Inc., Cambridge, Mass.
D. S. Allan, and G. H. Harris.
Available from the National Technical Information Service, Springfield VA 22161 as AD-A016 296, Price codes: A07 in paper copy, A01 in microfiche. U.S. Coast Guard Office of Research and Development Report No. CG-D-148-75, April 1975. 133 p, 10 fig, 1 tab, 6 append. DOT-CG-24, 655-A.

Descriptors: *Pollutant identification, *Accidents, *Hazards, *Transportation, *Water quality control, *Chemical hazards, *Water pollution, *Pollution abatement.
Identifiers: *Information systems, Health hazards, Hazardous materials, Environmental protection, Hexane, Hydrogen cyanide, Sulfuric acid, Chemical Hazards Response Information System (CHRIS).

The need for improved technical and other information for meeting emergencies connected with the transportation of hazardous materials, particularly actual or potential chemical discharges regardless of mode is examined. The Chemical Hazards Response Information System (CHRIS), under development by the United States Coast Guard to furnish in-depth guidance during emergencies involving waterborne transport, was seen as a likely prototype for other modes as well. Accordingly, a reevaluation of CHRIS has been conducted to determine the desirability of enlarging its scope to encompass all modes of transportation. It is concluded that the expanded system would indeed be beneficial in reducing losses to life, property, and the environment. The information system would be composed of a decentralized organization providing response guidance on request to local emergency services personnel, a computerized hazard assessment system operated at Headquarters, and three reference manuals furnished to all response organizations. A pretest of the basic system components and services is recommended before full-scale development in view of several potential difficulties: (1) the anticipated low frequency of need per user installation, (2) the very short response time available for effective action, and (3) the large number of disparate autonomous emergency response personnel who do not operate within a defined regional or national organization or communication system. (Sinha-OEIS)
W77-03903

DEVELOPMENT OF AN OIL-WATER POLLUTION MONITORING SYSTEM,
Naval Postgraduate School, Monterey, Calif.
T. M. Houlihan, and B. D. Tyler.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 552, Price codes: A05 in paper copy, A01 in microfiche. Report No. NPS-59Hm75071A, July 1975. 89 p, 29 fig, 8 tab, 8 ref, 4 append.

Descriptors: *Pollutant identification, *Oil pollution, *Monitoring, *Sampling, Analytical techniques, *Water pollution, Oil, Baseline studies, Environmental effects, *Water resources, Fuel oil.
Identifiers: *Outer Continental Shelf, Bilge water, Ballast water.

The progress made during FY75 in the fabrication and the testing of an automatic oil pollution monitoring system is documented. In the system developed, a Direct Difference method of Total Organic Carbon determination was utilized to ascertain oil concentrations. Using this monitor, it was possible to specify the concentration of any oil, independent of type, in an oil separator effluent sample. In the final phases of the study, preliminary investigations on prototype improvements were initiated and oil concentrations of bilge water samples were determined. (Sinha-OEIS)
W77-03908

AN OIL SLICK SAMPLING SYSTEM,
Coast Guard Research and Development Center, Groton, Conn.
S. H. Fortier, and J. R. Jadamec.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A010 708, Price codes: A02 in paper copy, A01 in microfiche. Report No. CG-D-71-75, Dec 1974. 22 p, 2 fig, 2 tab, 11 ref, 2 append.

Descriptors: *Oil spills, *Oil pollution, *Pollutant identification, *Analytical techniques, *Water pollution, *Baseline studies, *Environmental effects, *Resources development, Water resources, *Sampling.
Identifiers: *Outer Continental shelf.

An oil slick sampling system has been developed for routine sampling of oil spills for identification purposes. The system can effectively sample all types of oil spills, collecting enough sample for analysis by several analytical techniques. In 80% of the spills sampled, the system collected sufficient oil for analysis by fluorescence and infrared spectroscopic and thin layer and gas chromatographic technques. In the remaining 20%, the system collected sufficient oil for at least two of the above-mentioned techniques. The developed system is lightweight, compact and inexpensive. (Sinha-OEIS)
W77-03909

CRUDE OIL SPILLS RESEARCH. AN INVESTIGATION AND EVALUATION OF ANALYTICAL TECHNIQUES,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
C. A. Wilson, E. P. Ferrero, and H. J. Coleman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 128, Price codes: A03 in paper copy, A01 in microfiche. Report of Investigations No. 8024, 1975. 32 p, 7 fig, 16 tab, 42 ref.

Descriptors: *Oil spills, *Oil pollution, *Analytical techniques, *Pollutant identification, *Water pollution, Environmental effects, *Baseline studies, Water resources, Chemical analysis.
Identifiers: *Outer Continental Shelf, *Crude oil, Coastal zone.

The Bureau of Mines started a continuing program to investigate and evaluate analytical techniques to assist governmental agencies to select simple, rapid, reliable methods for crude oil spill identification. Six crude oil samples were analyzed to evaluate gas-liquid chromatography, atomic absorption spectrophotometry, infrared spectoscopy, sulfur and nitrogen determinations, mass spectrometry, nuclear magnetic resonance spectroscopy, and ultraviolet spectrophotometry. Samples were studied from the following selected fields: El Morgan, Egypt; Duri, Indonesia; Minagish, Kuwait; Bachaquero, Venezuela; Gach Saran, Iran; and Prudhoe Bay, Alaska. These samples were chosen to represent high-production fields that are likely to be involved in oceanic transport. Over 50 years of Bureau of Mines analytical research on petroleum served as the basis for evaluation of the experimental results to determine which of the methods are effective techniques to identify crude oil spills. Gas-liquid chromatographic analysis, atomic absorption spectrophotometric analysis, and sulfur-nitrogen determinations are recommended as the most useful of the techniques investigated. (Sinha-OEIS)
W77-03910

MEASUREMENT OF VOLATILE AND NONVOLATILE HYDROCARBONS IN SELECTED AREAS OF THE ATLANTIC OCEAN,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
R. A. Brown, T. D. Searl, and E. B. Prestridge.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-75-11112, Price codes: A03 in paper copy, A01 in microfiche. Final Report to U.S. Department of Commerce, Maritime Administration, June 1975. 44 p, 9 fig, 5 tab, 6 ref, append. 5-38000.

Descriptors: *Atlantic Ocean, *Oil pollution, *Gases, Resources, *Sampling, Water resources, *Baseline studies, *Organic compounds, *Pollutant identification, Measurement.
Identifiers: *Outer Continental Shelf, *Hydrocarbons(Non-volatile).

An earlier study covered the measurement and interpretation of total dispersed nonvolatile hydrocarbons and extractable organics in the Atlantic and nearby waters. This report discusses results of a subsequent study in selected areas of the Atlantic Ocean. Samples were analyzed as collected from a previously sampled area around Iceland and near the coast of Greenland. Data for surface and subsurface (-10 meter) water agree with previous measurements. A previously unsampled area off the northeast coast of South America was found to contain hydrocarbons and extractable organics at about the same level as the northern waters. Volatile (C4-C8) hydrocarbons were measured in some surface and subsurface samples from along the Gulf of Mexico/New York City tanker route. (Sinha-OEIS)
W77-03911

MARSH GAS FROM THE ATLANTIC COASTAL PLAIN,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2L.
W77-03913

APPLICATIONS OF ERTS IMAGERY AND SHIPBOARD OBSERVATIONS TO COASTAL ENVIRONMENTS STUDIES. PART I - HYPERSALINE ENVIRONMENTS, PART II - COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W77-03921

DETERMINING THE CONCENTRATION OF OIL IN WATER SAMPLES BY INFRARED SPECTROPHOTOMETRY, PHASE I - SAMPLE AGING STUDY,
Naval Ship Research and Development Center, Annapolis, Md. Materials Dept.
S. Finger, H. Feingold, E. Timko, and S. Orbach.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-011 040, Price codes: A06 in paper copy, A01 in microfiche. Report No. NSRDC 4535, December 1974. 109 p, 10 tab, 7 ref, 4 append.

Descriptors: *Pollutant identification, Water pollution, *Oil pollution, *Analytica techniques, Sampling, *Spectrophotometry, Oil wastes.
Identifiers: *Infrared spectrophotometry, *Aging studies(Oil).

Oil in water samples of Naval Distillate Fuel Oil (NDFO) and steam Turbine Lubricating Oil (MS 2190 TEP) at concentrations of 16 p/m and 100 p/m were studied to determine and quantify aging due to various types of degradation with time, under normal storage conditions. The purpose of the sample aging study was to obtain information for use in scheduling sample shipment and analysis in a forthcoming inter-laboratory study of the oil concentration measurement technique, as well as to estimate the allowable delay in sample analysis after field sampling. The results indicate that agingdue to degradation of MS 2190 TEP lube oil in the samples is negligible and may be ignored for about one month of sample storage time. A lower 95% confidence limit on the aging time for NDFO that will result in a drop of 10% in the initial concentration (Prior to aging) is about two weeks. An unexpected initial drop in oil concentration, which is not attributable to microbial and other modes of degradation, was noted in both oil types (the effect is more pronounced for NDFO). Possible causes for this apparent loss of oil are suggested but further investigation is required to determine its cause and to quantify it. (Sinha-OEIS)
W77-03922

LOSS OF SUBMERGED VEGETATION IN THE PENSACOLA BAY SYSTEM,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
For primary bibliographic entry see Field 5G.
W77-03946

LIGHTNESS AND COLOR OF THE SEA WATER IN THE TAGONOURA-PORT, (IN JAPANESE),
Tokai Univ., Shizouka (Japan). Faculty of Marine Science and Technology.
H. Natsume, T. Miyata, and T. Suzuki.
J Fac Mar Sci Technol Tokai Univ 8, p 121-128, 1974.

Descriptors: *Sea water, *Color, Water pollution sources, Asia, *Colorimetry, *Pollutant identification, Turbidity.
Identifiers: *Japan(Tagonoura-Port).

The pollution of the Tagonoura-Port (Japan) was studied by observing the differences in the color of the sea water by colorimetry. The lightness decreased with decreased depth; the shallower the depth the higher the tubidity. The lightness was lowest at the mouth of the Numa River at all depths. The pollutant sources are in the Numa River. At all locations sampled, the sea water was whitish yellow at 2 m and 5 m, and yellow at the surface.--Copyright 1976, Biological Abstracts, Inc.
W77-03965

COAL PILE LEACHATE - QUANTITY AND QUALITY CHARACTERISTICS,
Pickard and Anderson, Auburn, N.Y.
For primary bibliographic entry see Field 5B.
W77-03992

COLONIAL AUKS AND EIDERS AS POTENTIAL INDICATORS OF OIL POLLUTION,
Canadian Wildlife Service, Delta (British Columbia).
K. Vermeer.
Marine Pollution Bulletin, Vol. 7(No. 6), Sept., 1976, p. 165-167, 1 tab., 1 fig., 11 ref.

Descriptors: Oil, *Oil pollution, Water pollution effects, *Canada, *Water birds, *Wildlife, *Common Eider duck, Aquatic animals, *Bioindicators, Oily waters, Oil spills, Oil wastes, Pollutant identification.
Identifiers: *Colonial auk, Alcids, Murres, Common Eider, Western Arctic Sea birds, Western Greenland, Eastern Arctic.

Colonial auk (Alcid) populations can be used as indicators of the effects of oil pollution on the seabirds of Canada's coastal zones. Of approximately 11 million breeding colonial alcids in Canada and in adjacent West Greenland waters, 87% are murres. Common Eiders may serve as the best indicators of the effects of oil pollution in Canada's western Arctic where colonial alcids are scarce. (Katz)
W77-04029

LONG-TERM EFFECTS OF METHYLMERCURIC CHLORIDE ON THREE GENERATIONS OF BROOK TROUT: TOXICITY ACCUMULATION, DISTRIBUTION AND ELIMINATION,
Environmental Research Lab., Duluth, Minn.
For primary bibliographic entry see Field 5C.
W77-04031

ACCLIMATION AND TOLERANCE OF ARTEMIA SALINA TO COPPER SALTS,
Royal Univ. of Malta, Valletta. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-04044

HYDROCARBONS IN A WILDERNESS LAKE,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
For primary bibliographic entry see Field 5B.
W77-04048

PETROLEUM COMPONENTS AND OBJECTIONABLE MALODOROUS SUBSTANCES IN FISH FLESH POLLUTED BY BOILER FUEL OIL,
Okayama Univ. (Japan). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5C.
W77-04053

MERCURY IN TISSUES OF MUSSEL OFF SOUTHERN CALIFORNIA,
Southern California Coastal Water Research Project, El Segundo, Calif.
For primary bibliographic entry see Field 5C.
W77-04060

AN ASSESSMENT OF THE POLLUTION OF CORNISH COASTAL WATERS,
Atkins Research and Development, Epson (England).
For primary bibliographic entry see Field 5B.
W77-04061

PETROLEUM-DEGRADING ACHLOROPHYLLOUS ALGA PROTOTHECA ZOPFI,
Maryland Univ., College Park. Dept. of Microbiology.
J. D. Walker, R. R. Colwell, Z. Vaituzis, and S. Meyer.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A016 507, Price codes: A02 in paper copy, A01 in microfiche. Nature, Vol. 254, No. 5499 (1976), p 423-424, 2 tab., 3 fig., 9 ref.

Descriptors: Oil, Oil pollution, Oily waters, *Marine algae, *Chesapeake Bay, Marine, Soil algae, Plant physiology, Gas chromatography, *Pollutant identification.
Identifiers: *Petroleum degrading algae, *Prototheca zopfi.

An unusual organism, believed to be an algae, has the ability to degrade petroleum hydrocarbons. The organism is identified as Prototheca zopfi. (Katz)
W77-04062

MICROBIOLOGICAL AND CHEMICAL STUDY OF WATER IN THE BAIA DE ARIES MINE, (IN ROMANIAN),
Societatea de Stiinte Biologice din R.S.R., Bucharest.
I. Lazar, E. Grou, L. Dumitru, and F. Popea.
Stud Cercet Biol 26(3), p 197-203, 1974.

Descriptors: Microbiology, Bacteria, Sulfur, Iron, Mines, Thiobacillus ferroxidans, Spectrometry, Pollutant identification.
Identifiers: Baia-de-Aries mine(Romania), *Romania, Sulfuric-acid.

Research conducted at the Baia de Aries (Romania) mine in the course of the last 2 yr made it possible to conclude that chemoautotrophic bacteria of the Thiobacillus genus, which oxidate the reduced compounds of S and Fe, are very widespread in the water samples gathered from various levels in the mine. It was demonstrated through chemical and microbiological analyses that, during the passage of water through the deposit rock (consisting principally in sulfides), some processes take place which determine the formation of important quantities of sulfuric acid and Fe salts as a result of the activity of Thiobacillus type bacteria. The biological activity is gradually increased towards the lower levels, reaching a maximum at level O.--Copyright 1976, Biological Abstracts, Inc.
W77-04077

ODOROUS COMPOUNDS IN RAW WATER OF WATER SUPPLIES: IDENTIFICATION OF CAMPHOR AND P-METHYLACETOPHENONE, (IN JAPANESE),
Toyama Univ. (Japan). Research Inst. for Wakanyaku.
T. Kikuchi, T. Mimura, Y. Kawashima, Y. Moriwaki, and Y. Masada.
Yakugaku Zasshi 95(12), p 1517-1519, 1975.

Descriptors: *Odors, Chromatography, *Gas chromatography, *Mass spectrometry, *Pollutant identification, Lakes, Organic compounds, Water pollution.
Identifiers: Acetophenone, *Camphor, *Japan, Lake Inbanuma(Japan).

By gas chromatography and gas chromatography-mass spectrometry, camphor was detected from the water of Lake Inbanuma, a Chiba Prefecture (Japan) water supply source, and camphor and p-methylacetophenone were detected from the water supply source. These compounds are partly responsible for the objectionable odor and taste of the water.--Copyright 1976, Biological Abstracts, Inc.
W77-04078

TRACE ELEMENT CONTENT IN THE BOTTOM SEDIMENTS AND WATER OF THE RIVERS PRZEMSZA AND VISTULA IN THE SECTION OF ITS MOST INTENSE POLLUTION, (IN POLISH),
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
K. Pasternak, R. Truski, and S. Baran.
Ochr Prazyr 40, p 351-360, 1975.

Descriptors: *Trace elements, *Bottom sediments, Water pollution, Cadmium, Copper, Chromium, Lead, Rivers, Spectrophotometry, Zinc, *Pollutant identification, Manganese.
Identifiers: Vistula River(Poland), Przemsza River(Poland), *Atomic absorption spectrometry, *Poland.

Levels of trace elements were determined in the sediments and waters of the Przemsza and Upper Vistula rivers in the area of strongest pollution (Oswiecim-Krakow-Nowa Huta, Poland) and in the area (Grabie-Polaniec) where more intense self-purification of the water and its strong dilution by relatively clean waters occur. The microelements in the water were determined using atomic absorption spectrophotometry and in the sediments using emissmion spectromety. Other physico-chemical properties of the sediments were determined. The amounts of most microelements in sandy sediments many times exceeded the amounts in the sedximents of polluted aquatic environments and land soils. In the area of the strongest pollution the water of the Przemsza and Vistula rivers contained many times more microelements than the water of clean rivers. In the strongly polluted water of the Przemsza and Vistula particularly great amounts of Zn, Cu, Cd and Mn were found. In the investigated sediments great concentrations of Zn, Cu, Pb and Cr were recorded. In the sediments of the Vistula a high content of microelements is maintained with very little fluctuation in a 95-km sector, indicating many points of pollution inflow. The quantitative level of microcomponents in the sediments depends on the degree of mineral pollution of the river. In the investigated polluted rivers there was no definite relation between the amount of microcomponents in the sediments and the content of organic matter and, in many cases, also of clayey fractions in them. In the sectors of the River Vistula raised by mill-dams and sluices the sediments were richer in microelements than the sediments of its normal river-bed. The microelements cumulate in the sediments in the form of settled suspension, and partly in the form of ions absorbed on the water surface. The quantitative level of some microelements in the sediments of the Przemsza and Tistula is also influenced by the amount of the admixture and hard coal dust particles which constitute a large percentage of water suspensions. In the in-

vestigated sector of the River Vistula the silts deposited with floods constitute the source of heavy metal pollution of soil. During floods land biotopes and aquatic environments are subject to contamination with heavy metals.--Copyright 1976, Biological Abstracts, Inc.
W77-04079

USE OF NEW TYPE OF MEMBRANE FILTERS IN ISOLATING SALMONELLA FROM WATER OF SURFACE RESERVOIRS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
E. K. Gipp, V. V. Tabunshchikov, V. I. Vakhrushev, O. I. Nachinkin, and E. Rubak.
Gig Sanit 2, p 86-87, 1976.

Descriptors: *Filters, Reservoirs, *Salmonella, Isolation, *Pollutant identification.
Identifiers: *Membrane filters.

Phenylone membrane filters with pores of 0.3, 0.5 and 1 micro-m were tested under natural and laboratory conditions. Due to their high filtration rate and concentrating ability, filtres with 1 micro-m pores are recommended as preliminary filters; the others can be used in Salmonella determination. The filters withstood sterilization by boiling without deforming or curling.--Copyright 1976, Biological Abstracts, Inc.
W77-04082

SOME PROBLEMS OF SANITARY MICROBIOLOGY, (IN RUSSIAN),
G. G. Mirzoev.
Gig Sanit 8, p 107-109, 1975.

Descriptors: *Microbiology, *Microorganisms, Public health, Dairy industry, Farm wastes, *Bioindicators, Methodology, *Pollutant identification.
Identifiers: Colibacillus, *Microbes.

The microbe number, the total number of microbes in 1 g or 1 ml, is a common microbiological method of evaluating water, milk and other products for their sanitary status in combination with colibacillus titer determination. Since microorganisms continue to multiply in milk, dairy and other products, a determination of the microbe number as an index of their sanitary evaluation has no practical value.--Copyright 1976, Biological Abstracts, Inc.
W77-04085

VARIATIONS IN CD, PB AND CU CONTENT OF WATERS OF THE LOWER ESTUARY OF THE SAINT LAWRENCE DURING THE SUMMER OF 1972, (IN FRENCH),
Quebec Univ., Rimouski. Dept. of Oceanography; and Quebec Univ., Rimouski. Dept. of Pure Sciences.
M. Arnac.
Mar Chem 4(2), p 175-187, 1976.

Descriptors: *Cadmium, *Lead, *Copper, Estuaries, Summer, Spectrophotometry, *Pollutant identification, *St Lawrence seaway, *Canada, Primary productivity, Water pollution effects.
Identifiers: Atomic absorption spectrophotometry.

Concentrations of Cd, Pb and Cu were determined in the lower estuary of the St. Lawrence River (Canada) during the summer of 1972 (from May-Aug). Seven sample stations distributed in the estuary were studied. Analysis measurements were made using atomic absorption spectrophotometry and are related to the soluble metals. The concentrations of Cd are low and no important variations occur. Mean analysis of Cd abundance gives a value of 1.05 micro-g/l. The Cu/Pb ratio is nearly equal to unity. Average concentrations for all the stations are 3.11microns/l for Cu and 3.48 micro-g/l for Pb. Higher values are measured for Cu and Pb during May and these are related to the freshwater inflow arising from the thawing period. The lowest concentrations are observed during June and July and are in correspondence with the spring period of intense primary production. The biologic-dynamic conditions affecting the concentrations of Cd seem to be different from those affecting Cu or Pb contents (without considering pollution phenomena). The highest average values for Cu and Pb were found on the S shore of the estuary. The values obtained in this work compared favorably with other results gathered in the neighboring area.--Copyright 1976, Biological Abstracts, Inc.
W77-04086

MICROCALORIMETRIC INVESTIGATIONS IN POLLUTED SURFACE WATERS, (IN GERMAN),
Innsbruck Univ. (Austria). Inst. of Hygiene and Microbiology.
F. Tiefenbrunner.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/6), p 519-526, 1976.

Descriptors: *Bacteria, Microorganisms, *Calorimetry, *Pollutant identification, Oxidation, Water pollution control, Microbiology, Trickling filters.

Hygienic control of polluted surface waters must be correlated with measurements of decomposition rate of heterotrophic microbial populations. Since 1970 different methods were tested for this purpose. Uptake kinetic studies of radioactive labeled substrates and automated BOD (biochemical O2 demand) registrations cannot be handled as flow systems. Flow-microcalorimetry (heat conduction principle) is an easier approach to test the activity of heterotrophic aquatic populations. Probes from a trickling-filter outflow from an oxidation pond and from a small river were tested simultaneously in a flow-microcalorimeter and a drop-microcalorimeter after adding 200 microgram/l glucose. The resulting voltage/timecurves show a good correlation to the heterotrophic capacity of the probes. The minimal detectable continuous heat effect was 1 micro W corresponding to a (relative) activity of 5.6 . 10 to the fourth power bacterial colonies/ml on Difco agar (counts after 48 h incubation at 22 micro C). A modification of the flow-microcalorimeter using a 5-10 times larger reaction vessel enabled the system to be used in testing scarcely polluted surface waters and for toxicity tests of surface water samples.--Copyright 1976, Biological Abstracts, Inc.
W77-04091

THE DETECTION OF AEROMONADS OF THE HYDROPHILA-PUNCTATA-GROUP, IN THE HYGIENIC ANALYSIS OF DRINKING WATER, (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene-Institut.
R. Schubert.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/6), p 482-497, 1976.

Descriptors: *Potable water, *Water analysis, *Public health, *Bacteria, Coliforms, *Pollutant identification, Sewage, E. coli, Water pollution.
Identifiers: *Aeromonads, Aeromonas-hydrophila, *Aeromonas-punctata.

A retrospective analysis was done of bacteriological water examinations of single wells within which E. coli, coliform and colony count determinations were performed in a 1 yr examination period, and the water samples were examined for Aeromonas of the hydrophila-punctate-group (A. hydrophila, A. punctata). The single wells were divided into 5 groups because of pre-testing and reexamination results and because of the local circumstances. The relation of aerogenic to anaerogenic aeromonads in wells close to the shore in the direction of infiltration was examined. Flat wells without influence of surface water in groundwater areas with relatively porous surface layer were studied. While in river water loaded with sewage the anaerogenic aeromonads dominate the population up to about 80%, their proportion diminishes in the shore filtrate so that within a certain distance, in groundwater filtered through the shore, only aerogenic aeromonads are found. From water of flat wells with relatively porous surface layer exclusively aerogenic aeromonads colonies were isolated. Because the aerogenic aeromonads were not found in deep wells but were found more or less frequently in flat wells the proof of anaerogenic Aeromonas demonstrates surface water sewage pollution.
W77-04092

5B. Sources Of Pollution

THE EFFECT OF THE CENTRAL ARIZONA PROJECT ON THE THERMAL STRUCTURE OF LAKE HAVASU,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2H.
W77-03624

LOSSES OF DIURON, LINURON, FENAC, AND TRIFLURALIN IN SURFACE DRAINAGE WATER,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 5G.
W77-03639

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON TRANSPORT OF PERSISTENT CHEMICALS IN AQUATIC ECOSYSTEMS.
National Research Council of Canda, Ottawa (Ontario).
Available from Executiv Sec. Internation/Conference on Transport of Persistent Chemicals in Aquatic Ecosystems, National Research Council of Canada, Ottawa, Canada. $8.00. Published by National Research Council of Canada, Ottawa, Canada. Editorial Review Board:de Freitas, A. S. W., Kushner, D. J., and Qadri, S. U., 334 p.

Descriptors: *Conferences, *Publications, Sediment transport, Water pollution, Pollutants, Distribution, Mercury, Chlorinated hydrocarbons, Pesticides, Aquatic environment, *Ecosystems, Model studies, Mathematical models, Food chains, *Path of pollutants.
Identifiers: Ottawa River Project.

The conference was held under the sponsorship of the National Research Council of Canada in Ottawa, Canada on May 1-3, 1974 as part of the design of the Ottawa River Project. The proceedings includes 46 papers which were presented at the conference as well as an author index and a list of participants. The proceedings are divided into four sections which deal with: water and sediment transport and pollution distribution, physical and biological exchanges between aquatic ecosystem compartments, food chain transport of pollutants, and ecosystem simulation and mathematical modelling. (See W77-03643 thru W77-03683) (Chilton-ORNL)
W77-03642

THE DISTRIBUTION AND TRANSPORT OF MERCURY IN THE SEDIMENTS OF THE LAURENTIAN GREAT LAKES SYSTEM,
Canada Centre for Inland Waters,Burlington (Ontario).
R. L. Thomas.

In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-1 -I-16, 17 fig, 2 tab, 18 ref.

Descriptors: *Sedimentation, *Sediment transport, *Mercury, *Great Lakes, *Sediment distribution, Deposition(Sediments), Chemicals, *Path of pollutants, Water pollution.

1,317 samples of the uppermost 3 cms of sediment from the Great Lakes (excluding Lake Michigan) were analyzed for total mercury. Concentrations ranged from 4 to 9500 ppb with a mean of 347 ppb. Major conclusions of the study were that Lakes Superior and Michigan as head waters of the system had low mercury levels with no throughput to Lake Huron. Lake Superior showed localized areas of mercury enrichment. Lake Huron showed generally low levels of mercury with local areas of higher concentration, reflecting localized inputs and minealization, occurring in Georgian Bay. Southern Lake Huron appeared to be receiving input from Saginaw Bay and transmitting the bulk of this to Lake St. Clair. Mercury distribution in Lake St. Clair suggests that much of the input carries straight throught to the Detroit River and to Lake Erie. The sediment bound mercury in Lake Erie moves relative to lake circulation to a final sink in the eastern basin of the lake. Mercury in Lake Ontario is derived predominantly from sources in the Niagara River. Distribution reflects net physical circulation with deposition occurring in the main basins of the lake. (See also W77-03642) (Chilton-ORNL)
W77-03643

TRANSVERSE DISPERSION IN MEANDERING CHANNELS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2E.
W77-03644

THE DISTRIBUTION AND TRANSPORT OF BED SEDIMENTS AND PERSISTENT POLLUTANTS IN THE OTTAWA RIVER, CANADA,
Ottawa Univ. (Ontario). Dept. of Geology.
B. R. Rust, and D. G. Waslenchuk.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-25-I-40, 12 fig, 2 tab, 29 ref.

Descriptors: *Sedimentation, *Water pollution, Pollutants, Heavy metals, Mercury, Sediment transport, Sediment distribution Deposition(Sediments), Chemicals, *Path of pollutants, Canada.
Identifiers: Chemical desorption, *Ottawa River(Canada).

The mineralogy of bed sediments in a three-mile reach of the Ottawa River was studied. Mean grain size was closely related to water depth and flow velocity. The best overall correlation was that between iron and grain size. Finer sediments, having a higher relative surface area, showed a higher concentration of iron and this appeared to control manganese and mercury concentrations. Heavy metal concentrations also appeared to correlate with wood chip content because of their high porosity and relative surface area. Mercury levels in bed sediment appeared to be decreasing by about 50% per year. The loss is achieved by mechanical transport of detrital grains with adsorbed mercury and by chemical desorption. (See also W77-03642) (Chilton-ORNL)
W77-03645

THE ROLE OF FLOCCULATION IN THE TRANSPORT OF PARTICULATE POLLUTANTS IN THE MARINE ENVIRONMENT,
Bedford Inst., of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
K. Kranck.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-41-I-46, 6 fig, 15 ref.

Descriptors: *Sedimentation, *Water pollution, *Sediment transport, Aquatic environment, Pollutants, Flocculation, Particle size, Settling velocity, *Path of pollutants.

Fine-grained particulate pollutants introduced into the marine environment do not retain their original distinct grain size but flocculate into larger particles. The size distribution of the effluent is dependent on the size distribution of the natural sediment distribution. Transport behavior and sedimentation pattern of natural suspended sediment may be used as a guide to the dispersal of particulate pollutants in a marine area. Water transport and flushing rate is not a reliable indication of th dispersal of particulate pollutants because particles tend to flocculate into larger units with sufficiently high settling rates to give them a different net speed and direction from that of the water in which they are suspended. (See also W77-03642) (Chilton-ORNL)
W77-03646

MERCURY TRANSPORT BY BED SEDIMENT MOVEMENTS,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
D. R. Townsend, A. Kudo, H. Sayeed, and D. R. Miller.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-47-I-51, 6 fig, 3 ref.

Descriptors: *Sedimentation, *Water pollution, *Sediment transport, *Mercury, Particle size, Sorption, Clays, Sands, *Path of pollutants, Canada.
Identifiers: Organic sediments, Ottawa River(Canada).

The sediment samples collected for use in the study were composed of three basic materials: sands, clays, and organics(wood chips). Fine to coarse sands constituted the predominant sedimentary material in the main channel of the Ottawa River but wood chips mixed with very fine sand and clay fractions were predominant in specific locations. Wood fibre matrix had a higher sorption capacity for mercury than did sands and the sorption capacity was also found to vary with particles size. Particles ranging in size from 0.45 to 38 microns had approximately 99 times higher sorption capacity than that of sand particles ranging from 100 to 150 microns. Laboratory tests made use of a 2-dimensional pressurized flume to assess critical values of flow parameters at which movement of particles takes place. (See also W77-03642) (Chilton-ORNL)
W77-03647

PHYSICAL EXCHANGE IN STREAM ECOLOGY STUDIES,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03648

GEOCHEMICAL INTERACTION IN THE RECENTLY INDUSTRIALIZED STRAIT OF CANSO,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Geoscience Center; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
R. R. Cranston.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-59-I-67, 4 tab, 6 fig, 14 ref.

Descriptors: *Geochemistry, Environment, Biology, Sedimentation, Deposition(Sediment), Pulp and paper industry, Wood wastes, Pulp wastes, Geology, Chemistry, Environmental effects, Distribution, Sediment transport, Industrial wastes, Canada.
Identifiers: *Strait of Canso(Canada).

Biological physical, geological, and chemical parameters were measured at over 200 locations in the Strait of Canso in 1973. It was concluded that the effluent from a pulp mill was primarily responsible for controlling the distribution of chemical and biological parameters. Less than 1% of the total dissolved metal and particulate organic matter in the effluent has been retained by the bottom sediments over the past 10 years. Data from analysis of bottom sediments indicated that the silicious matrix of the sediments is diluted by large concentrations of wood pulp fibre. Anomalous concentrations of metal are found in the organic rich sediments close to the discharge pipe. The strongest negative correlation in the data was found between zinc and benthic foraminifera populations. (See also W77-03642) (Chilton-ORNL)
W77-03649

HEAVY METAL CONCENTRATIONS AND DISTRIBUTIONS IN RIVER MOUTH SEDIMENTS AROUND THE GREAT LAKES,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. for Environmental Studies and Engineering.
T. C. Hutchinson, and J. Fitchko.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-69-I-77, 3 tab, 2 fig, 17 ref.

Descriptors: Sedimentation, *Heavy metals, *Sediment distribution, *Sediment transport, Fluvial sediments, *Great Lakes, Mercury, Lead, Cadmium, Zinc, Copper, Nickel, Cobalt, Manganese, Chromium, Silver, Cores, *Path of pollutants, Water pollution.

Surface and core samples of sediments were analyzed by atomic absorption spectrophotometry for the metals Hg, Pb, Cd, Zn, Cu, Ni, Co, Mn, Cr, and Ag to make a general comparison of the relative degree of heavy metal acculation in sediments between the Great Lakes. It was concluded that there was a greater input of a least seven of the ten metals into the Lower Great Lakes. The greatest difference in input occurred for cadmium, chromium, and mercury and the smallest differences between lakes for nickel, cobalt, and manganese. Most of the core samples indicated no surface accumulation of heavy metals. Homogeneous concentrations throuhout the core indicated resuspension, homogenation, and redeposition of sediments by dredging, shipping activity, and current action. Significant correlations were found between the concentrations of several heavy metals and the loss on ignition (organic matter) data and with the clay fraction of the sediment. (See also W77-03642) (Chilton-ORNL)
W77-03650

HEAVY METAL POLLUTANTS IN THE SEDIMENTS OF THE RHONE RIVER,
Geneva Univ. (Switzerland). Dept. of Earth Sciences.
J. P. Vernet, and L. M. Johnston.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-79-I-81, 3 fig, 2 tab, 3 ref.

Descriptors: *Water pollution, Sedimentation, *Heavy metals, Sediment distribution, Mercury, Nickel, Copper, Zinc, Lead, Sediment transport, *Path of pollutants, Pollutant identification.
Identifiers: *Rhone River(Switz), *Switzerland.

Approximately 100 samples of Rhone River sediments were analyzed for Hg, Pb, Cr, Cd, Co, Sn, V, Ni, Zn, and Cu. Data from these and previous analyses showed that mercury is the primary trace metal contaminant in the system. Nickel may be considered as a natural pollutant in the upper reaches of the Rhone but sources of man-made pollution are evident in the area near Lake Geneva. Copper, zinc and lead showed localized elevated levels which in most cases may be attributed to specific sources. Pollution in the individual canal systems was found to be extensive but (except for mercury, nickel, copper, zinc, and lead) carryover into the main river system is negligible. (See also W77-03642) (Chilton-ORNL)
W77-03651

TRACE METAL POLLUTION FROM A METROPOLITAN AREA: SOURCES AND ACCUMULATION IN THE LOWER FRASER RIVER AND ESTUARY,
British Columbia Univ., Vancouver. Westwater Research Centre.
K. J. Hall, and K. Fletcher.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974, p I-83-I-87, 2 fig, 3 tab, 7 ref.

Descriptors: Environmental effects, *Water pollution effects, Pollutants, Water quality, Heavy metals, Sediments, Toxicity, Fish, Sedimentation, Canada, *Path of pollutants.
Identifiers: Lower Fraser River(BC), *Fraser River(BC).

Water quality problems in the lower Fraser River were found to be due to the presence of pathogenic microorganisms and to potential toxicity problems as a result of some high trace metal levels in the reaches of the river influenced by urban-industrial development. The highest trace metal concentrations were measured in waters influenced by metropolitan Vancouver. Surface sediments showed an apparent increase in trace metals in the Fraser estuary with a sewage treatment plant implicated as one of the major sources. Although most trace metal concentrations that were measured do not appear to be acutely toxic to fish, with the sporadic nature of their discharge some potentially dangerous levels could occur. (See also W77-03642) (Chilton-ORNL)
W77-03652

TRANSPORT OF SOME ORGANOCHLORINES IN B. C. WATERS,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
P. C. Oloffs, and L. J. Albright.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-89-I-92, 3 fig, 3 tab, 6 ref.

Descriptors: *Water pollution, *Organic compounds, Pesticides, *Organic pesticides, DDT, Polychlorinated biphenyls, Sediments, Sediment transport, Air-water interfaces, *Path of pollutants.
Identifiers: *Organochlorines, *Lindane, *Chlordane.

Results of laboratory studies carried out with DDT, lindane, chlordane and a PCB indicated that bottom sediments can not only prevent escape of residues from natural waters into the atmosphere, they can also prompt movement from water downwards into sediments. Depth and water flow (agitation) are important factors in this process. Residues found in a shallow, microbiologically active water body may partition into bottom sediment and be metabolized. Residues in a deep and undisturbed lake may well move into the atmosphere while residues originating from sewage outfalls could remain suspended in the water and with it move into an open marine environment. (See also W77-03642) (Chilton-ORNL)
W77-03653

HEAVY METALS IN THE LOWER MISSISSIPPI,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
R. Hartung.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p I-93-I-98, 12 tab, 10 ref.

Descriptors: *Water pollution, *Heavy metals, Water, Sediments, Aquatic life, Fish, Shrimp, Cadmium, Chromium, Lead, Manganese, Mercury, Arsenic, *Mississippi River, Path of pollutants.

Samples of fish and shrimp, sediments, and water from the lower 280 miles and the delta of the Mississippi were analyzed for cadmium, chromium, lead, manganese, mercury and arsenic. The concentration of each of the elements in filtered water was near the lower limit of detection. Sediments showed the greatest concentrations (Arsenic, 7.82 ppm; Cadmium, 0.332 ppm; Chromium, 9.33 ppm; Lead, 13.8 ppm; Manganese, 599. ppm; and Mercury, 0.329 ppm). The biological availability of the metals appeared to be low with no significant differences in the body burdens between predators and bottom feeders. (See also W77-03642) (Chilton-ORNL)
W77-03654

SUSPENDED SOLIDS AND VELOCITY DISTRIBUTIONS IN THE OTTAWA RIVER,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03655

ADSORPTION ISOTHERMS FOR THE UPTAKE OF ZINC BY CLAY MINERALS IN A FRESHWATER MEDIUM,
Washington State Univ., Pullman. Nuclear Radiation Center.
A. C. M. Bourg, and R. H. Filby.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-1-II-5, 4 fig, 2 tab, 5 ref.

Descriptors: *Aquatic environment, *Sediments, *Clays, *Zinc, *Adsorption, Spectrophotpmetry, Ion exchange.
Identifiers: *Adsorption isotherms.

Preliminary results are presented of a study of the uptake of zinc by three clay minerals: illite, montmorillonite, and kaolinite. The experiments were carried out by using a fresh-water model to allow application of the results to natural systems. Constant pH and constant ionic strength were maintained during the experiments. The znc concentrations before and after equilibration with the clays were determined by atomic absorption spectrophotometry. The rapidity of the adsorption reaction suggested an ion-exchange mechanism as opposed to physical adsorption. This conclusion is supported by the known ion-exchange properties of clays in a variety of environments. (See also W77-03642) (Chilton-ORNL)
W77-03656

SULPHIDE MEASUREMENT USING AMMONIUM MOLYBDATE,
Ontario Ministry of the Environment, Toronto. Sediment and Biomaterials Lab.
For primary bibliographic entry see Field 5A.
W77-03657

ADSORPTION OF C14-DDT TO PARTICLE SURFACES,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
B. T. Hargrave, and G. A. Phillips.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-13-II-18, 3 fig, 20 ref.

Descriptors: *Chemical properties, *Adsorption, *DDT, *Pesticides, Sediments, Particle size, Carbon, Aqueous solutions, Water pollution, Pollutant identification.

Equilibrium concentrations of DDT observed on particulate matter are the net result of adsorption, desorption and metabolism by micro-organisms. Preliminary experiments under both static and perfusion conditions indicated that little DDT adsorbed on silt and sand particles is removed by rinsing. It was concluded that adsorption of C14-DDT from seawater by particles ranging in size from bacterial cells to large sand grains is inversely related to mean particle diameter and directly related to concentration providing that saturation levels are not exceeded. (See also W77-03642) (Chilton-ORNL)
W77-03658

PARTITIONING AND UPTAKE OF PESTICIDES IN BIOLOGICAL SYSTEMS,
Dow Chemical U. S. A., Midland, Mich.
For primary bibliographic entry see Field 5C.
W77-03659

WATER-SEDIMENT DISTRIBUTION OF CHLORINATED HYDROCARBON PESTICIDES IN VARIOUS ENVIRONMENTAL CONDITIONS,
Missouri Univ., Rolla. Dept. of Civil Engineering.
J. C. Huang.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-23-II-30, 9 fig, 1 tab, 4 ref.

Descriptors: Environmental effects, *Pesticides, Distribution, Water pollution, Sediment, *DDT, *Dieldrin, *Heptachlor, Chlorinated hydrocarbon pesticides, Chemical reactions, *Path of pollutants.

DDT, dieldrin, and heptachlor distributions in aquatic systems containing clay minerals and/or humic acids were studied with emphasis placed on adsorption rate, mechanisms, and equilibrium distribution. The data indicated that the equilibrium distribution of pesticides is mainly dependent upon the type of pesticide and the characteristics of sediment material. The effect of environmental factors, such as pH, temperature, salinity, and organic pollution in water body, is only of minor significance. In general, chlorinated hydrocarbon pesticides were extremely hydrophobic in nature and easily adsorbed by sediment materials. The adsorption mechanism primarily involved strong forces of chemical interaction. (See also W77-03642) (Chilton-ORNL)
W77-03660

CHLORINATED HYDROCARBONS IN COASTAL MARINE ECOSYSTEMS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W77-03661

DYNAMICS OF INTERACTION OF CATIONS AND FULVIC ACID,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W77-03662

MICROANALYSE DE L'INCORPORATION D'UN METAL LOURD DANS LES ECAILLES D'UN POISSON,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
For primary bibliographic entry see Field 5A.
W77-03663

DYNAMICS OF MICROBIALLY PRODUCED FULVIC MATERIAL IN AQUATIC ENVIRONMENTS RELATIVE TO DIFFERENT CONDITIONS OF TEMPERATURE AND PH,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
For primary bibliographic entry see Field 5C.
W77-03664

DYNAMIQUE DE DEGRADATION DU PHENOL DANS LE FLEUVE SAINT-LAURENT,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
V. Zoulalian, F. Bessou, A. Tessier, P. G. Campbell, and S. A. Visser.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-53-II-58, 5 fig, 20 ref.

Descriptors: Environmental effects, *Biodegradation, *Phenols, Kinetics, *St Lawrence River, Canada, *Path of pollutants, Industrial wastes, Oil wastes.
Identifiers: Montreal(Canada).

The study shows that the concentration of phenolic substances from the waste outlets of Montreal oil refineries diminishes rather rapidly downstream from the source of pollution. The kinetic model of the Michaelis-Menten equation is applied to experimental results to demonstrate the kinetics of biodegradation of phenol. (See also W77-03642) (Chilton-ORNL)
W77-03665

MICROBIAL DEALINGS WITH HEAVY METALS,
Ottawa Univ., (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-03666

MERCURY AND MERCURIAL RESISTANCE DETERMINED BY PLASMIDS IN ESCHERICHIA COLI AND PSEUDOMONAS AERUGINOSA,
Washington Univ., St. Louis, Mo. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-03667

THE ROLE OF TIN IN BACTERIAL METHYLATION OF MERCURY,
Maryland Univ., College Park. Dept. of Chemistry.
C. Huey, F. E. Brinckman, S. Grim, and W. P. Iverson.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-73-II-78, 5 fig, 18 ref.

Descriptors: *Water pollution, *Path of pollutants, Bacteria, *Tin, Mercury, Water pollution sources, Chemistry, Pseudomonas, *Chesapeake Bay, Bays.
Identifiers: *Mercury methylation.

Tin was reported as a frequent co-contaminant with mercury in river sediments as well as in water plants where it was found in much higher concentrations and in a direct proportion to mercury. Growth of a tin- and mercury-tolerant strain of Pseudomonas from the Chesapeake Bay in the presence of both Hg(II) and Sn(IV) results in the formation of methylmercury. Although this methylation of mercury does occur, all the parameters for reproducibility have not been established. A postulated mechanism to account for the formation is that Sn(IV) produces methyltin species by a biological pathway and this methyltin species with Hg(II) produces methylmercury by an abiotic pathway. (See also W77-03642) (Chilton-ORNL)
W77-03668

TRANSPORT AND DISTRIBUTION OF MERCURY IN SEDIMENTS,
Battelle Columbus Labs., Ohio.
R. S. Reimers, P. A. Krenkel, and A. J. Englande, Jr.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-79-II-92, 6 fig, 9 tab, 48 ref.

Descriptors: Environmental effects, Water pollution, Pollutants, *Mercury, *Sediments distribution, Transfer, *Path of pollutants, *Sediment transport.

The distribution and transport of mercury in sediment is dependent on the specific properties of the natural water, the native biota, and the specific constituents of the sediment. Identification was made of the general mechanisms causing the transfer of mercury to and from the sediment to other sinks in the aquatic environment (biota, air, and water). Mercury adsorbed in sediment can be solubilized and transported to the biota by the natural solubility of mercury, its ability to complex, alterations in the dissolved oxygen, and variations in the sediment pH's. It was concluded that observed low mercury concentration in natural waters are due to sorption of mercury by biotic and abiotic sediment, precipitation and coagulation of mercury, and the high volatility of mercury and its compounds. (See also W77-03642) (Chilton-ORNL)
W77-03669

BACTERIAL MOBILIZATION OF MERCURY IN CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W77-03670

INTERACTION BETWEEN AQUATIC PLANTS AND RIVER BED SEDIMENTS IN THE UPTAKE OF MERCURY FROM FLOWING WATER,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W77-03671

LEAD TRANSPORT IN A RIVER ECOSYSTEM,
Illinois Univ. at Urbana-Champain. Dept. of Civil Engineering.
H. V. Leland, and J. M. McNurney.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974, p III-17-III-23, 4 fig, 3 tab, 9 ref.

Descriptors: Environmental effects, Water pollution, *Water pollution sources, *Lead, Sediments, Particle size, Aquatic animals, Periphyton, Rivers, Ecosystems, *Illinois.
Identifiers: *Vermilion River(ILL).

Daily determination of filterable and particulate lead in waters at five locations in the Saline Branch of the Vermilion River were made from February 1972 to July 1974. Results showed that coarse suspended matter is the principal means by which lead is exported from the area. Lead concentrations of bed sediments varied with compositional and textural characteristics of the sediments and with location in the stream. Mainstream sediments exposed to urban runoff and the wastewater treatment plant effluent were significantly higher in lead content than sediments of the rural drainage. Lead accumulations in periphyton were dependent upon the community composition and proximity of pollution sources. Lead concentrations were generally highest in burrowing animals with non-burrowing detritus feeders and herbivores containing higher concentrations than predators. (See also W77-03642) (Chilton-ORNL)
W77-03672

THE FORM OF MERCURY IN FRESHWATER FISH,
Ontario Ministry of the Environment, Toronto. Inorganic Trace Contaminants Lab.
For primary bibliographic entry see Field 5A.
W77-03673

ORIGIN AND FATE OF MERCURY COMPOUNDS IN FISH,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
A. S. W. De Freitas, S. U. Qadri, and B. E. Case.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-31-III-36, 6 tab, 19 ref.

Descriptors: Environmental effects, *Water pollution effects, Organic compounds, *Mercury, Fish, *Path of pollutants, Pollutants, Vectors(Biological), Food chains.

The purpose was to compare water and food as vectors for input of inorganic and organic mercury into fish by measuring uptake, clearance rates, and distribution in the organism following single-pulse dosing with Hg203 labelled mercury compounds. Tissue distribution of both forms of mercury approached a steady state about two months after dosing depending on water temperature and size of fish. Differences in tissue distribution were found between different forms of mercury and between different input vectors. The data suggest that environmentally contaminated fish may obtain most of their body burden of methyl mercury by direct uptake from water rather than through the food chain. (See also W77-03642) (Chilton-ORNL)
W77-03674

THE WAYS OF TRANSPORT OF MERCURY TO FISH,
National Swedish Environment Protection Board, Stockholm. Research Lab.
T. B. Hasselrot, and A. Gothberg.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-37-III-47, 13 fig, 4 ref.

Descriptors: Environmental effects, *Water pollution effects, Pollutants, *Mercury, *Path of pollutants, Fish, On-site investigations, Food chains, Industrial wastes.
Identifiers: *Sweden.

Outlets from seed disinfection mills have introduced methyl mercury into waters in Sweden. The quantities of mercury introduced in this way have been very small but have resulted in accumulations of more than 1 mg/kg in the fish flesh. Phenyl mercury, used as a pulp preservative in the cellulose industry, has also brought mercury into the environment. Experiments were conducted with caged fish in these waters and results showed that strong concentrations occur in fish flesh over short periods of time and it seems probable that the most important mercury transport in this case has occurred from fish to fish. In tagged fish with high mercury values, moved from the contaminated lake to unaffected lakes, no clear elimination of the mercury was seen after one year. (See also W77-03642) (Chilton-ORNL)

W77-03675

TIME AND SPACE DEPENDENCE OF POLLUTANT LEVELS IN AQUATIC BIOTA, FIELD STUDIES,
Naturhistoriska Riksmuseet, Stockholm (Sweden).
M. Olsson.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-49-III-60, 20 fig, 2 tab, 31 ref.

Descriptors: Environmental effects, *Water pollution effects, Pollutants, *Polychlorinated biphenyls, *Mercury, *DDT, Distribution, Fish, *Pikes, *Path of pollutants, Dispersion.

Dispersion of mercury, DDT, and PCB substances in pike from the Archipelago outside Stockholm were studied. Generally the mercury levels were above the natural background level in the Baltic. Mercury levels decrease when moving from the inner to the outer parts of the archipelago. Levels of PCB's decrease significantly when moving from the inner to the outer parts of the archipelago while no statistical difference between the inner and outer parts of the archipelago were found for the DDT's(DDT, DDE, and DDD). (See also W77-03642) (Chilton-ORNL)
W77-03676

TRENDS OF PCB AND DDT IN FISH AND AQUATIC BIRDS,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
V. Zitko.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-61-III-64, 2 tab, 17 ref.

Descriptors: Environmental effects, *Water pollution effects, *Chlorinated hydrocarbon pesticides, *Polychlorinated biphenyls, *DDT, Fish, Birds, Gulls, *Herrings.
Identifiers: Cormorant.

The concentration of PCB and DDT and metabolites is presented in herring (Clupea harengus) taken in 1972 and 1973, and in double-crested cormorant (Phalacrocorax auritus) and herring gull (Larus argentatus) eggs collected from 1971 to 1973. Data indicated that PCB concentrations were more or less constant or only slightly increasing while the levels of DDT and metabolites appear to be decreasing. (See also W77-03642) (Chilton-ORNL)
W77-03677

MERCURY EFFECTS ON SWIMMING AND METABOLISM OF TROUT,
Fisheries and Marine Service, Winnipeg (Manitoba).
For primary bibliographic entry see Field 5C.
W77-03678

COMPUTER MODELING,
National Research Council of Canada, Ottawa, (Ontario). Div. of Biological Sciences.
D. R. Miller, and M. Zuker.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-1-IV-9, 4 fig, 8 ref.

Descriptors: Model studies, *Mathematical models, Rivers, Water pollution sources, Pollutants, *Path of pollutants, Transfer, Canada, *Computer models.
Identifiers: Pollutant transport, *Ottawa River(Canada).

The Ottawa River Project is partly characterized by the central position of a large-scale mathematical model of the overall system dynamics. This paper describes various aspects of the model. At present, the simplest model under consideration involves six compartments: water, bed sediment, suspended material, invertebrates, higher plants, and fish. 17 interactions are considered in terms of pollutant transport. In addition to a description of the model and programming techniques, the paper deals with the question of validation, both from the standpoint of reproducing historical data and by the method of sensitivity analysis. (See also W77-03642) (Chilton-ORNL)
W77-03679

ON REALISM AND GENERALITY OF BIO-ACCUMULATION MODELS. TOWARDS A GENERAL METHODOLOGY,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
T. Fagerstrom, and B. Asell.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-11-IV-16, 1 tab, 2 fig, 11 ref.

Descriptors: *Model studies, *Mathematical models, Biochemistry, Water pollution effects, Pollutants, Transfer, *Path of pollutants, *Methodology.
Identifiers: *Bio-accumulation models.

A general methodology is discussed in terms of realism (the degree to which the equations used and the variables employed correspond to the real world phenomena they present) and phenomena is discussed with two examples being given. One example demonstrates how a frequently observed relation between the biological half-life of a trace substance and body weight may be explained from the common weight-dependence of metabolic rate. The other example shows that there is no bilogically found reason for using first-order kinetics in food-chain models. (See also W77-03642)
W77-03680

AQUATIC FOOD CHAIN MODELS FOR ESTIMATING BIOACCUMULATION AND BIODEGRADATION OF XENOBIOTICS,
Fish and Wildlife Service, Columbia, Mo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 5C.
W77-03681

MATHEMATICAL MODELING OF ESTUARIAL ECOSYSTEMS,
California Univ., Davis. Dept. of Civil Engineering.
G. T. Orlob.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-27-IV-43, 11 fig, 14 ref.

Descriptors: *Model studies, *Mathematical models, *Aquatic habitats, Estuaries, Hydrodynamics, Hydrologic aspects, Water quality, Biological communities, *Ecosystems, *Estuarine environment, Path of pollutants, *California.
Identifiers: *San Francisco Bay-Delta area(Calif).

A set of models is described which are designed to simulate hydrodynamic, hydrologic, water quality, and biologic behavior of aquatic systems of an estuarine environment. The particular set of models is applied to the San Francisco Bay-Delta area. Convection-diffusion equations describe the transport of substance identified with the water mass. Knowledge of hydrodynamic behavior necessary for the solution of this equation is derived from the prototype or a model. Aquatic ecologic processes are described mathematically through the concept of conservation of mass and energy. A set of such equations form the basic model. The set characterizes the transformations of biomass due to growth, respiration, predation and mortality in the estuarine habitat. A model for long-range simulation and another for dynamic response are described. (See also W77-03642) (Chilton-ORNL)
W77-03682

THE OTTAWA RIVER PROJECT,
National Research Council of Canada, Ottawa (Ontario). Div. of Biological Sciences.
D. R. Miller.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-45-IV-49, 2 tab, 2 fig, 5 ref.

Descriptors: Environmental effects, *Water pollution effects, *Model studies, *Mathematical models, Projects, Project purposes, *Mercury, Chlorinated hydrocarbons, Distribution, Rivers, *Canada, *Path of pollutants.
Identifiers: *Ottawa River Project(Canada).

The Ottawa River Project is a joint study by the National Research Council Laboratories and the University of Ottawa. The study gives emphasis to the role of mathematical modeling in the project and the interaction between modelling and allocation of research effort. From the standpoint of the entire project the following conclusions have been made: the distribution of mercury in the test section is almost entirely in the non-biological parts, particularly the sediment, and to a lesser extent, the water. Although only a small fraction of the total pollutant burden is present in biological materials, these are of greatest interest to human users, and a precisely calibrated predictive model must be produced covering all of the biological compartments as well as the physical. (See also W77-03642) (Chilton-ORNL)
W77-03683

CONTINGENCY PLAN FOR SPILLS OF OIL AND HAZARDOUS MATERIALS FOR INLAND WATERS OF REGION III.
Environmental Protection Agency, Philadelphia, Pa. Region III.
For primary bibliographic entry see Field 5G.
W77-03700

THE COSTS AND EFFECTS OF CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS IN THE ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W77-03701

A MATHEMATICAL MODEL FOR WATER QUALITY EVALUATION IN THE SOUTH CAROLINA GRAND STAND,
Clemson Univ., Dept. of Civil Engineering.
S. W. McChesney, and B. L. Edge.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 952, Price codes: A05 in paper copy, A01 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 45, September 1976. 93 p, 19 fig, 10 tab, 25 ref, 1 append. S-034-SC.

Descriptors: *Estuaries, *Water quality, *Stochastic processes, Planning, Water resources, Coliform, *South Carolina, *Mathematical models, Model studies, *Path of pollutants, *Simulation analysis.
Identifiers: *Intracoastal waterway(SC), *Grand Stand(SC).

The purpose was to develop a suitable mathematical model for simulating water quality in the Intracoastal Waterway behind Myrtle Beach, South Carolna. Within this context, the Custer-Krutchkoff estuary model and the FWQA dynamic estuary model were used to provide a stochastic

aspect to the available deterministic, dynamic models. The stochastic addition to these models gives the user a more complete knowledge of the effects of discharges of pollutants on the water quality of an estuary. Instead of a single specific value for a water quality parameter, as would be obtained from a deterministic model, the stochastic model is able to predict a range of values along with their frequency of occurrence. The more complete knowledge given by this component makes possible better management decisions. For example, the knowledge of the frequency of occurrence for a value of pH caused by an acidic discharge could be extremely important in establishing regulations for the discharge. Because of the harmful effects that even short periods of low pH can have, a stochastic simulation of this parameter would yield more useful knowledge upon which to base a management decision than would a deterministic model.
W77-03731

CURRENTS AND POLLUTANT DISPERSION IN LAKE MICHIGAN, MODELED WITH EMPHASIS ON THE CALUMET REGION,
Illinois Univ. at Chicago Circle. Dept. of Information Engineering.
P. L. Katz, and G. M. Schwab.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 015, Price codes: A05 in paper copy, A01 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 111, March 1976, 70 p, 20 fig, 1 tab, 70 ref, 2 append. S-035-ILL and S-042-ILL.

Descriptors: *Computer models, Water circulation, Water pollution sources, *Dispersion, *Lake Michigan, *Illinois, *Water quality control, Model studies, Lake shores, *Path of pollutants.
Identifiers: *Lake currents, Calumet Harbor Region(Ill), Chicago area(Ill), *Chicago-Calumet Harbor shoreline.

This report summarizes several years of Lake Michigan modeling efforts on the preservation and improvement of nearshore water quality. These efforts have illuminated some remaining technical problems and suggested ways for modeling highly polluted regions like the Chicago-Calumet Harbor shoreline. An adaptation of the Simons three-dimensional current model for Lake Michigan pollutant-dispersion studies is presented. Typical results from Lake Michigan are presented to demonstrate its excellent capabilities for treating a wide range of large-scale phenomena. A rationale is developed for the use of local episode simulations as a means of over-coming some difficulties in obtaining sufficient data for calibration and verification of whole-lake models. Then, an application of a simple model to some observed 'bad-water' episodes is presented. Comparison of observations and model results suggests that the onset of some periods of extreme pollution is governed wind-driven transport. Under southerly winds, high pollutant levels are often observed at the 68th St. Crib within 20-40 hours following a heavy rain at Calumet Harbor. The limitations of using a purely hydrodynamic model to treat bioreactive contaminants are shown, and improvements in resolution required in future, more accurate episode models are estimated. A number of conclusions are drawn regarding the directions in which future nearshore research efforts might profitably proceed.
W77-03732

HYDRAULICS OF SURFACE BUOYANT JET,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
For primary bibliographic entry see Field 8B.
W77-03743

SOME REMARKS ON THE MAINTENANCE OF THE SALINITY DISTRIBUTION IN ESTUARIES,
Liverpool Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
For primary bibliographic entry see Field 2L.
W77-03764

THE EFFECTS OF AGRICULTURAL RUN-OFF AND SILTATION ON A NEW RECREATIONAL LAKE,
Illinois State Univ., Normal. Dept. of Biological Sciences; and Illinois State Univ., Normal. Dept. of Chemistry.
A. C. Sievert, T. A. Nelson, J. M. Fioramonti, D. J. Gillard, and G. L. Hortin.
Transactions of the Illinois Academy of Science, Vol. 68, No. 4, p 369-380, December 1975. 2 fig, 3 tab, 10 ref. NSF GY-11527.

Descriptors: *Lakes, *Surveys, *Water quality, *Illinois, On-site investigations, Data collections, *Agricultural runoff, Recreation, Surface waters, Deposition(Sediments), Reservoirs, Water temperature, Hydrogen ion concentration, Pesticides, DDT, DDE, Aldrin, Dieldrin, Phosphates, Nitrates, Dissolved oxygen, Chlorides, Zooplankton, Bethic fauna, Fish, Carp, Oligochaetes, *Silting, Silts.
Identifiers: *Evergreen Lake(Ill), *Siltation.

Chemical, biological, and physical analyses were performed at four-year-old Evergreen Lake, Illinois, in an effort to determine whether the quality of the lake was being affected by its agricultural setting. All chemical parameters were found to be within permissible levels for public water supplies. Benthos populations were sparse, yet plankton populations indicated a rapidly maturing lake. The fish populations were imbalanced with 75% consisting of Carp and Gizzard Shad. Sedimentation, particularly in the shallow south end, which will lead to loss of volume and creation of mud flats, appeared to be the major problem confronting this lake in the future. (Humphreys - ISWS)
W77-03766

AN ASSESSMENT OF TECHNIQUES FOR HYDROTHERMAL PREDICTION,
Massachusetts Inst. of Tech. Cambridge. Dept. of Civil Engineering.
G. H. Jirka, G. Abraham, and D. R. F. Harleman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-250 509, Price codes: A18 in paper copy, A01 in microfiche. Report NUREG-0044, March 1976. 417 p, 120 fig, 6 tab, 166 ref, 3 append. NRC AT(11-1)-2374.

Descriptors: *Forecasting, *Hydrothermal studies, *Powerplants, *Cooling water, *Distribution patterns, Thermal powerplants, Electric powerplants, Model studies, Mathematical models, Laboratory tests, Evaluation, Analytical techniques, Thermal pollution, Rivers, Estuaries, Lakes, Discharge(Water), Flow, Temperature, Water temperature, Heated water, Water quality, Hydrology, Hydraulics, *Path of pollutants.
Identifiers: *Waste heat, Cooling ponds, *Hydrothermal prediction.

A critical assessment is provided of techniques - both mathematical models and experimental methods - to predict temperature distribution in the water environment resulting from waste heat releases from steam-electric generation. Such predictions constitute an integral part of environmental impact assessment of powerplant facilities. Different types of receiving waters and discharge modes were discussed. Types of receiving waters include lakes, rivers, estuaries, coastal waters, and cooling ponds; discharge modes were surface and submerged discharges. Mathematical models were evaluated in regard to their physical validity, degree of field or laboratory verification, and computational utility. Predictive techniques were found to be reliable and accurate only if they are applied within limited portions of the temperature field (zone models), and a careful integration is necessary to obtain complete descriptions of the temperature field. This restriction stems from difficulties in representing the variety of heat transport processes in the water environment in a single analytical or experimental technique. Certain models whose limits of applicability have been established were recommended for use in hydrothermal impact assessment. (Sims-ISWS)
W77-03768

SEASONAL AND SHORT-TERM VARIATIONS IN THE CONCENTRATION AND SUPPLY OF DISSOLVED ZINC TO POLLUTED AQUATIC ENVIRONMENTS,
University Coll. of Wales, Aberystwyth. Dept. of Geography; and University Coll. of Wales, Aberystwyth. Dept. of Geology.
D. L. Grimshaw, J. Lewin, and R. Fuge.
Environmental Pollution, Vol. 11, No. 1, p. 1-7, 1976. 2 fig., 2 tab., 15 ref.

Descriptors: *Zinc, *Rivers, *Fluctuations, *Mine wastes, Seasonal, Low flow, Runoff, Water pollution sources, Europe, Sampling, Metals, Waste disposal.
Identifiers: *River Ystwyth(Wales).

Monitored levels of dissolved zinc in the River Ystwyth, Wales, ranging from 0.17 to 0.88 mg/l, were related to discharge variations. Bulking of samples, infrequent sampling, and sampling without regard to the recording of discharges are inadvisable. Concentrations were highest at low flows (a 'dilution' effect), and for brief periods during the initial stages of storm runoff (a 'flushing' effect), but in terms of bulk zinc output the range of discharge variation (0.4 to 269.00 cu m/sec in 1973-1974) far outweighed the effect of varying concentration. An annual yield of 72 tons of dissolved zinc had been estimated for two successive years, with individual monthly yields ranging between 1.0 and 12.8 tons, the higher during winter discharges. This may explain observed variations in metal concentration in coastal waters and in certain biota, in addition to changes arising from varying rates of metabolic activity. The conclusion is that both seasonal and short-term fluctuations may be of varying significance in different biological contents. If peak concentrations are critical, then these appear to occur both at low flows and during the initial phases of storm runoff. The sampling program was conducted some 10 km downstream from a mining activity conducted a half-century ago; metal concentrations in the immediate vicinity of mining sites are much higher. (Auen-Wisconsin)
W77-03778

DISTRIBUTION OF LOW-MOLECULAR-WEIGHT HYDROCARBONS IN SOUTHERN BEAUFORT SEA,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
R. W. Macdonald.
Environmental Science and Technology, Vol. 10, No. 13, p 1241-1246, December, 1976. 5 fig, 10 ref, 2 tab.

Descriptors: *Organic compounds, *Sea water, *Water pollution, Wastes, Methane, Bottom sediments, Seepage, Continental shelf, Drilling, Water quality, Ships, Water pollution sources, Surface waters.
Identifiers: *Beaufort Sea, Ballast tanks, Dumping.

Seawater concentrations of C(1)-C(4) hydrocarbons were measured in the summers of 1974 and 1975 in the Southern Beaufort Sea continental shelf region. In general, there was good agreement between the levels of methane found in the surface waters of the Beaufort Sea and those found in similar environments by others. A few high methane concentrations were found, especially

near the bottom, and were attributed to seepage from the sediments. C(2)-C(4) saturated hydrocarbon concentrations were low, in contrast to other shelf areas where extensive shipping, ballast tank dumping, and drilling have occurred. Consequently, their concentrations could serve as useful indicators of deterioration of water quality in this area by future shipping or drilling activities. Unsaturated C(2)-C(4) hydrocarbon concentrations tended to be somewhat lower than those reported for other oceanic regions, possibly a consequence of low biological productivity in the shelf area at that time of year. (Witt-IPC)
W77-03793

EFFECTS OF FOREST CULTURAL TREATMENTS UPON STREAMFLOW,
Forest Station (USDA). Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W77-03795

IDENTIFICATION OF GASOLINE CONTAMINATION OF GROUNDWATER BY GAS CHROMATOGRAPHY,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
For primary bibliographic entry see Field 5A.
W77-03796

WATER QUALITY MONITORING: KANEOHE BAY AND SELECTED WATERSHEDS JULY TO DECEMBER 1975,
Hawaii Univ., Honolulu. Water Resources Research Center.
R. H. F. Young, L. S. Lau, S. K. Konno, and H. H. Lee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 031, Price codes: A05 in paper copy, A01 in microfiche. Technical Report No. 98, May 1976. 87 p, 1 fig, 15 tab, 22 ref, 8 append.

Descriptors: Water pollution effects, *Water pollution sources, *Water quality, Surface runoff, Estuarine environment, Pollutants, Organic loading, Bioindicators, *Hawaii, *Monitoring, Bays, Watersheds(Basins).
Identifiers: *Kaneohe Bay(HI), Oahu.

A Kaneohe Bay and watershed water quality monitoring survey was conducted to ascertain a dry-weather quality baseline. Stations upstream of highly developed areas and downstream near stream mouths were selected to determine the effect of land development on water quality; bay stations were located off stream mouths, over sewer outfalls in the southern sector and the main channels of the bay. Results yielded poorer quality in the more developed southern and central subareas compared to the less developed northern subarea, poor quality off stream mouths and at bay sewer outfalls. Water quality standards for Class AA (bay) and 2 (stream) waters were exceeded in the case of nutrients (N and P) and coliform bacteria, but were met in the case of pH and dissolved oxygen. Loading rates, based on mean flow data and parametric concentrations for N and P compared against 1968 data, indicate a twofold increase for the southern subarea, a lesser increase for the central subarea, and relatively little change for the northern subarea. The bay water contained but a few ppt of alpha and gamma chlordane, dieldrin, and PCP; stream water samples were generally slightly higher in concentration. DDT, DDD, DDE, lindane, heptachlor, and PCB were not detected. The highest level, although low in ppt of pesticides, was found in stream water draining developed land. Heavy metals, Cd, Cr, Cu, Pb, Hg, Ni, Zn, were present in bay waters in low background concentrations on the order of a few ppb. No gradation in heavy metal concentrations was observed in different parts of the bay and stream contents were comparable to those in the bay.
W77-03826

MIXING OF SUBMERGED TWO-DIMENSIONAL BUOYANT JETS IN UNIFORM BODIES OF WATER IN THE ABSENCE AND PRESENCE OF WIND ACTION,
California Univ., Berkeley. Div. of Hydraulic and Sanitary Engineering.
For primary bibliographic entry see Field 8B.
W77-03828

THE DECOMPOSITION OF LEAVES IN TWO SOUTHERN CALIFORNIA STREAMS,
California Univ., Santa Barbara. Dept. of Biological Sciences.
S. D. Hart.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 036, Price codes: A03 in paper copy, A01 in microfiche. Master of Arts Thesis, June 1975. 33 p, 8 fig, 3 tab, 17 ref. (California Water Resources Center Project UCAL-WRC-W-492). OWRT A-055-CAL(1).

Descriptors: *Decomposing organic matter, *Steams, *Leaves, *California, Bacteria, Fungi, Productivity, Degradation(Decomposition), Biodegradation.
Identifiers: Goleta(Calif), Santa Barbara(Calif), *Decomposition rates(Leaves).

Woodland streams are known to derive most of their biological energy from inputs of organic material that originated in adjacent terrestrial systems. Much of this material is in the form of intact tree leaves. Once submerged, leaves lose weight over time at a species-specific rate. Differences between leaf species are associated with the initial composition of the leaf and the rate of colonization by microorganisms principally fungi and bacteria. The effect of differences between leaf species on stream productivity is unknown. Results are discussed of a study comparing rates of decomposition of leaves of locally important trees in two southern California streams. (Snyder-California, Davis)
W77-03829

A MATHEMATICAL MODEL FOR SIMULATING WATER QUALITY UNDER NON-STEADY STATE CONDITIONS,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
A. K. T. Basaran.
PhD Thesis, 1976. 169 p, 18 fig, 6tab, 74 ref, 2 append. OWRT B-081-NC(1), 14-31-0001-5099.

Descriptors: *Mathematical models, *Water quality, *Simulation analysis, Streamflow, River forecasting, Stream forecasting, *North Carolina, Estuaries, *Path of pollutants.
Identifiers: Conservative substances, Non-conservative substances, *Chowan River Estuary(NC).

The study presents the development and verification of a mathematical model capable of simulating both the hydrodynamics and the water quality, as functions of time and space, in an estuary or a river which can be described by one-dimensional, unsteady mass transport and hydraulic equations. The hydrodynamic portion of the model is designed to accommodate six alternative hydraulic boundary conditions. In addition, this portion can be used to study the effect of wind on the water movement and in turn, on the pollutant distribution. The water quality portion of the model is capable of simulating conservative and non-conservative substances and coupled reaction systems. The 'sources' and 'sinks' associated with each substance considered include external and internal point and non-point sources and sinks. The model is calibrated and verified using the field data collected over a six-day period on the Chowan River Estuary, NC USA. Excellent agreement is obtained between the predicted and the measured values at the end of the sixth day. Unfortunately, at the time of the study, field data on wind and some of the 'sources' and 'sinks' were not available and therefore, could not be included in the model verification. (Stewart-North Carolina State)
W77-03831

RIVER AND COOLING WATER TEMPERATURE FLUCTUATIONS,
Minnesota Univ., Minneapolis. Dept. of Civil Engineering; and Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
H. Stefan, and V. N. Chau.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY11, Proceedings Paper 12514, p 1613-1627, November 1976. 9 fig, 1 tab, 12 ref, 2 append.

Descriptors: *Cooling water, *Water temperature, *Mississippi River, Discharge(Water), Dispersion, Rivers, Effluents, Outlets, Mixing, Monitoring, Water quality, *Thermal pollution, Time series analysis, Waste disposal, Water pollution sources, Powerplants, Path of pollutants.
Identifiers: *Mixing length, Extreme value analysis, Nonlinear curve fitting, Seasonal periodicities, Autocovariance, Spectral analysis.

Cooling water discharged from a powerplant changed the fluctuating water temperature characteristics of a receiving river in a clearly detectable way. Daily and hourly water temperature data from two powerplant sites on the Upper Mississippi River were used to compute for illustration the magnitude of such differences. Extreme value analysis, autocovariance and spectral analysis, and nonlinear curve fitting methods were applied. Amplitudes of seasonal periodicities, diurnal periodicities, and random components were determined. The results indicated that time series analysis of water temperatures measured downstream from an existing cooling water outfall may provide equally, or even more, realistic and useful information on the size of a cooling water plume as quasi-instantaneous surveys of spatial water temperature distributions provide. (Roberts-ISWS)
W77-03834

PREOPERATIONAL AND OPERATIONAL HYDROTHERMAL FIELD DATA ACQUISITION AND ANALYSIS,
Karlsruhe Univ. (West Germany). Institut Fuer Hydromechanik.
M. Markofsky.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY12, Proceedings Paper 12597, p 1711-1723, December 1976. 14 fig, 6 ref, 1 append.

Descriptors: *Thermal pollution, *Powerplants, *Water temperature, *Mathematical models, Data collections, Dyes, Surveys, Currents(Water), Regulation, Tides, Dispersion, Hydrology, Hydrothermal studies.
Identifiers: *Thermal plume, Current patterns, Dispersion coefficient, Synoptic temperature patterns.

Calibration of mathematical models for thermal plume prediction, design considerations, and regulatory requirements provides further motivation for obtaining field data during both the preoperational and operational status of the plant. An analysis of the parameters which are measured during hydrothermal surveys was given. Field techniques examined included calibrating mathematical models for current prediction from measured tide and current patterns; determining dispersion coefficients; developing synoptic temperature patterns from off-boat measurements; and flushing surveys in coastal waters. The consideration of using operational monitoring of temperature for the evaluation of low induced temperature rises on the order of 1.5F (0.83C) yields the conclusion that the operational monitoring should not be aimed at measuring these temperature rises directly but, rather, at verifying that the physical parameters used in the mathematical modeling of hydrothermal conditions were correctly evaluated. (Lee-ISWS)
W77-03837

AN INVESTIGATION INTO THE EFFECTS OF FORESTRY PLANTATIONS ON THE WATER QUALITY OF UPLAND RESERVOIRS IN NORTHERN IRELAND,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
C. E. Gibson.
Water Research, Vol. 10, No. 11, p 995-998, 1976. 2 tab, 5 ref.

Descriptors: *Water quality, *Reservoirs, *On-site data collections, *Forest management, On-site investigations, Lakes, Water analysis, Chemical analysis, Bioassay, Fertilization, Water pollution sources, Sampling, Analysis, Evaluation, Nitrogen, Phosphorus, Color, Turbidity, Conductivity, Iron, Hydrogen ion concentration, Foreign countries.
Identifiers: *Northern Ireland.

A study was made of water quality of a wide range of Northern Ireland lakes to determine the effect of the fertilization of forestry plantations. Twenty-six reservoirs were sampled during December 1974. From each reservoir, three samples were taken and then bulked to make one composite for each reservoir. Lakes with fertilized forest catchments contained very high phosphorus levels. Bioassay with Selenastrum suggested that nitrogen and phosphorus were the only elements limiting growth, and the supply of iron and trace metals was sufficient for large crops in nearly all cases. (Humphreys-ISWS)
W77-03840

WATERFOWL AND ACID PRECIPITATION IN NORWAY, (IN DANISH),
Zoologisk Museum, Oslo (Norway).
For primary bibliographic entry see Field 5C.
W77-03841

ECOSYSTEM OF THE RIVER PIVA AND BIOLOGICAL VALORIZATION OF ITS WATERS, (IN SERBO-CROATIAN),
Zagreb Univ. (Yugoslavia). Inst. of Zoology.
I. Matonickin, Z. Pavletic, K. Zunjic, and I. Habdija.
Glas Repub Zavoda Zast Prir Prir Muz Titogradu 8, p 61-79, 1975.

Descriptors: Rivers, *Ecosystems, *Water pollution, Water quality, Industrial wastes, Biology.
Identifiers: *Valorization, *Yugoslovia(River Piva).

An ecological-biocenological analysis of the River Piva showed that the biocenoses which develop in this river are typical of upper courses of karst rivers. A total 106 spp. of plants and animals were found. The water of the River Piva is on boundary between 1st and 2nd degree pollution. Only the spring region has a clearly expressed 2nd degree. A longitudinal section of biological water quality is presented graphically.--Copyright 1976, Biological Abstracts, Inc.
W77-03852

ACCUMULATION AND DISTRIBUTION OF TOTAL MERCURY IN ESTUARINE SEDIMENTS,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia). Atlantic Geoscience Centre; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
R. E. Cranston.
Estuarine and Coastal Marine Science, Vol. 4, No. 6, p 695-700, November 1976. 2 fig, 3 tab, 18 ref.

Descriptors: *Mercury, *Estuaries, *Sediments, *Canada, Cores, On-site investigations, Sampling, Evaluation, Measurement, Chemical analysis, *Distribution, Analysis, Heavy metals, Water pollution sources, *Path of pollutants, Statistical methods.
Identifiers: *Nova Scotia, *La Have River.

The mercury concentrations found in sediment cores from an estuary displayed maximum values in an area where the salt water influence on the river becomes significant. Statistical analyses indicated that the mercury concentrations are associated with fine sediments located in a specific area within the estuary. This was interpreted as resulting from mercury adsorption on sedimenting particulate matter. Organic carbon concentrations reach their highest values in the same area, but they do not correlate to a significant degree with the mercury data. The organic carbon concentrations appear to result from accumulation of vegetation debris and precipitation of dissolved organic matter. Mercury concentration gradients with depth in the sediment core are not evident. This is probably due to physical and biological mixing within the sedimentary environment. (Humphreys-ISWS)
W77-03857

HYDROLOGY OF THE SOLID WASTE BURIAL GROUND, AS RELATED TO THE POTENTIAL MIGRATION OF RADIONUCLIDES, IDAHO NATIONAL ENGINEERING LABORATORY,
Geological Survey, Boise, Idaho. Water Resources Div.
J. T. Barraclough, J. B. Robertson, V. J. Janzer, and L. G. Saindon.
Available from the National Technical Information Service, Springfield, VA 22161 as IDO-22056, Price codes: A09 in paper copy, A01 in microfiche. Open-file report 76-471, August 1976. 186 p, 35 fig, 20 tab, 42 ref, append.

Descriptors: *Path of pollutants, *Aquifers, *Radioactive waste disposal, *Underground waste disposal, *Idaho, Data collections, Groundwater, Hydrogeology, Geochemistry, Ultimate disposal.
Identifiers: Idaho National Engineering Laboratory, *Radionuclides.

A study was made (1970-1974) to evaluate the geohydrologic and geochemical controls on subsurface migration of radionuclides from pits and trenches in the Idaho National Engineering Laboratory (INEL) solid waste burial ground and to determine the existence and extent of radionuclide migration from the burial ground. A total of about 1,700 sediment, rock, and water samples were collected from 10 observation wells drilled in and near the burial ground of Idaho National Engineering Laboratory, formerly the National Reactor Testing Station (NRTS). Within the burial ground area, the subsurface rocks are composed principally of basalt. Wind- and water-deposited sediments occur at the surface and in beds between the thicker basalt zones. Two principal sediment beds occur at about 110 feet and 240 feet below the land surface. The average thickness of the surficial sedimentary layer is about 15 feet while that of the two principal subsurface layers is 13 and 14 feet, respectively. The water table in the aquifer beneath the burial ground is at a depth of about 580 feet. Fission, activation, and transuranic elements were detected in some of the samples from the 110- and 240-foot sedimentary layers. (Woodard-USGS)
W77-03874

WASTE-ASSIMILATION STUDY OF KOSHKONONG CREEK BELOW SEWAGE-TREATMENT PLANT AT SUN PRAIRIE, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
R. S. Grant.
Open-file report 76-655, November 1976. 44 p, 20 fig, 12 tab, 7 ref.

Descriptors: *Waste assimilative capacity, *Self-purification, *Streams, *Sewage effluents, *Industrial wastes, *Wisconsin, Sewage treatment, Waste water disposal, Path of pollutants, Streamflow, Flow rates, Tracers, Methodology, Water quality standards, Model studies, Dissolved oxygen.
Identifiers: *Sun Prairie(Wisc).

A waste-load-assimilation study of a reach of Koshkonong Creek below the Sun Prairie, Wisconsin, sewage-treatment-plant outfall indicated that a high level of treatment would be required to meet Wisconsin water-quality standards. To maintain a minimum dissolved-oxygen concentration of 5 mg/liter during the critical summer low-flow period, 5-day carbonaceous biochemical-oxygen demand in waste discharges should not exceed 5 mg/liter and ammonium nitrogen should not exceed 1.5 mg/liter. Advanced treatment with denitrification is required because stream-reaeration coefficients are not high enough to offset deoxygenation caused by an abundance of attached biological slimes. The slimes apparently consumed dissolved oxygen at a rate of about 110 mg/liter per day at the time of the stream survey. During the critical summer low-flow period, natural stream discharge is very small compared to waste-water discharge, so benefits of dilution are insignificant. An evaluation of two proposed alternative waste-water discharge sites indicated that the present discharge site is hydraulically superior to these sites. Stream-reaeration coefficients used in the study were based on measurements using the radioactive-tracer method. (Woodard-USGS)
W77-03876

ABATEMENT OF NITRATE POLLUTION IN A PUBLIC-SUPPLY WELL BY ANALYSIS OF HYDROLOGIC CHARACTERISTICS,
Geological Survey, Laguna Niguel, Calif.
For primary bibliographic entry see Field 5G.
W77-03879

DISTRIBUTION AND TREND OF NITRATE, CHLORIDE, AND TOTAL SOLIDS IN WATER IN THE MAGOTHY AQUIFER IN SOUTHEAST NASSAU COUNTY, NEW YORK, FROM THE 1950'S THROUGH 1973,
Geological Survey, Mineola, N.Y. Water Resources Div.
H. F. H. Ku, and D. J. Sulam.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 519/As, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 76-44, August 1976. 47 p, 27 fig, 4 tab, 9 ref.

Descriptors: *Path of pollutants, *Aquifers, *Nitrates, *Chlorides, *Dissolved solids, Water quality, Septic tanks, Water pollution sources, *New York.
Identifiers: *Long Island(NY), *Magothy aquifer.

Concentrations of nitrate, chloride, and total solids in water in the Magothy aquifer, southeast Nassau County, N.Y., show a steadily increasing trend from the early 1950's through 1973. Vertical distribution of nitrate, chloride, and total-solids concentrations as shown in cross sections of the study area indicate downward movement of these constituents from tens of feet to a few hundred feet in this time period. Maximum concentrations are in a zone underlying the areas of Westbury, Hicksville, and Plainview. Nitrate (as nitrogen) concentration increased from 4-5 mg/liter to 7 mg/liter in the area of Westbury and from 3 to 10 mg/liter in Plainview during the period 1950-73. Lowest nitrate concentrations are in the area south of a line running from North Merrick to South Farmingdale. Also, during the period analyzed (1950-73), a 10-mg/liter line of equal-chloride concentration on a cross section in the Westbury area moved downward a distance of less than 50 feet, and in the area of Hicksville, nearly 150 feet. Total-solids concentration doubled during the period 1950-73 in the area of Plainview, where maximum downward movement of pollutants was observed. (Woodard-USGS)
W77-03887

RESERVOIR-SYSTEM MODEL FOR THE WILLAMETTE RIVER BASIN, OREGON,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 2E.
W77-03891

AN EVALUATION OF SURFACE-MINE SPOILS AREA RESTORATION IN WYOMING USING RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. Water Resources Div.
G. C. Lusby, and T. J. Toy.
Earth Surface Processes, Vol 1, p 375-386, 1976. 4 fig, 1 tab, 9 ref.

Descriptors: *Rainfall simulators, *Land reclmation, *Coal mines, *Strip mines, *Spoil banks, *Wyoming, Runoff, Sediment yield, Slope stabilization, Vegetation effects, Clays, Planning, Evaluation, Erosion control.

A recently developed rainfall simulator was used to apply 'rainstorms' on restored spoils areas at two coal mining sites in Wyoming. Runoff and sediment yield were considerably greater from the reworked areas compared to similar measurements on nearby undisturbed areas. This may possibly be attributed to the fact that in the disturbed areas mean slopes were generally greater, there was more clay at the surface, and concentration of roots was not as great as in the undisturbed areas. The rainfall simulator appears to be a valuable tool in determining baseline data for later comparison with data from areas under rehabilitation. (Woodard-USGS)
W77-03892

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT. SPECIAL REPORT I: WATER QUALITY MODELLING AND MANAGEMENT STUDIES FOR CORPUS CHRISTI BAY: A LARGE SYSTEM APPROACH,
Texas Univ., at Austin. Center for Research in Water Resources.
E. G. Fruh, B. R. Penumalli, and R. H. Flake.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-247 458, Price codes: A11 in paper copy, A01 in microfiche. National Science Foundation, Research Applied to National Needs (RANN) Report No. NSF-RA-E-75-054, 1975. 239 p, 41 fig, 26 tab, 71 ref. GI-44363.

Descriptors: *Texas, *Bays, Management, *Water quality, *Estuaries, *Model studies, Baseline studies, Hydrodynamics.
Identifiers: *Coastal zone management(Tex), *Corpus Christi Bay(Tex), Operational guidelines.

A large systems approach to the problem of estuarine water quality modelling and management is considered. The steady state estuarine water quality model is formulated as a large scale matrix. This model has a simple structure that is ideally suited to optimization methods for quantitative water quality management analysis. The approaches developed here have been applied to Corpus Christi Bay on the Gulf Coast of Texas. The objective was to minimize the total cost of treatment, and the corresponding variables of optimization were the levels of treatment to which various sources have to be treated. Four optimal policies for quantitative water quality management corresponding to different constraint conditions are determined for Corpus Christi Bay. (Sinha-OEIS)
W77-03898

PHOTOGRAMMETRIC EXPERIMENTS ON NEARSHORE MIXING AND DIFFUSION,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 2L.
W77-03907

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOL VI. IMPACT OF OFFSHORE TERMINALS ON CONTIGUOUS PORTS,
Harris (Frederic R.), Inc., New York.
For primary bibliographic entry see Field 5G.
W77-03923

A REPORT ON THE METHYLMERCURY SITUATION IN PAR POND,
Georgia Univ., Athens. Dept. of Zoology.
J. E. Schindler, D. J. Williams, and J. J. Alberts.
Report No. SRO-825-1, June 1975. 21 p. 1 fig., 4 tab, 24 ref. AT(38-1(-825.

Descriptors: *Mercury, *Impoundments, *Cooling water, *Fish populations, Bottom sediments, Absorption, Nuclear reactors, Gas chromatography, Fish behavior, Ecology.
Identifiers: *Methylmercury, Bioaccumulation, *Par Pond(Geo), Savannah River(Geo).

Hypotheses are examined for various pathways of mercury methylation in a cooling water pond of the Atomic Energy Commission's Savannah River Plant, with the objective of reducing methylmercury concentrations in the fish population. The ratio of methylmercury to total mercury in crappie and suckers ranged from 70-100%; other fish had 100% methyl to total mercury; the top predator, bass, had the highest total mercury concentrations among all fish. Several postulates are considered about methylmercury source(s), including that the mercury methylation occurred in vivo and was a function of the physiological state of the fish, which would explain the large intraspecific variability of methylmercury; or that methylation is a function of the general environment and the behavioral differences of the trophic relations of the fish lead to their variable accumulations. All tests showed that understanding of mercury behavior in the aquatic environment is inadequate. Just as the potential for the alkylation of mercury in the sediments of the pond could be demonstrated, it can be shown that other aquatic environments have varying potentials for electron transport, mercury reduction and alkylation. Par Pond sediments contained very low mercury concentrations. Organic ligand methylation and mercury reduction may be a possible mechanism to account for both the mercury distribution and the methylmercury concentration in the fish. (Auen-Wisconsin)
W77-03954

TECHNICAL AND MICROECONOMIC ANALYSIS OF CADMIUM AND ITS COMPOUNDS,
Versar, Inc., Springfield, Va.
D. H. Sargent, and J. R. Metz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 625, Price codes: A10 in paper copy, A01 in microfiche. Report No. EPA 560/3-75-005, June 1975. 209 p. 11 fig., 36 tab., 107 ref. 68-01-2926.

Descriptors: *Cadmium, *Public health, *Industrial wastes, *Economics, Toxicity, Toxins, Water pollution sources, Feasibility studies, Cost-benefit analysis, Industrial production, Implied benefits, Pollution abatement, Legal aspects, Regulation, Soil contamination.
Identifiers: *Plastics industry, Electroplating industry, Nickel-cadmium batteries, Primary zinc industry, Secondary zinc industry, Secondary copper industry.

Two alternative sets of controls of cadmium are recommended by a study of the role played by the metal and its compounds in the American economy, its effects in the environment, the need for limitations, and their economic feasibility. To optimize various abatement possibilities, comparisons were made among two types of data: (1) documentation of cadmium production, uses, prevalence and pollutant pathways; and (2) assessments of present and projected health hazards from the metal. Data is provided on cadmium's role in the primary zinc industry, in electroplating, in plastics, in nickel-cadmium batteries and in the secondary metals industry. In drawing up the recommendations, 39 control alternatives were first posited, including projections identifying subindustries likely to be affected by each control, probable implementation feasibility, effectiveness and estimated cost. From these, minimal and maximal recommendations were drawn up. Minimal controls would include continued air and water pollution abatement, environmentally-proper disposal on land of industrial cadmium wastes, and regulation of application rates to agricultural lands of cadmium-bearing materials. Maximal recommendations would range in severity from limitation of cadmium impurities in zinc industry products, to outright restriction or prohibition of cadmium imports to the U.S. (Harris-Wisconsin)
W77-03963

GROUND-WATER POLLUTION NEAR A LANDFILL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
W. E. Kelly.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 102, No EE6, Proceedings Paper 12609, p 1189-1199, December 1976. 12 fig, 2 tab, 23 ref, 1 append.

Descriptors: *Water pollution sources, *Landfill, *Aquifers, *Rhode Island, Groundwater, Conductivity, Chlorides, Water quality, Resistivity, Groundwater movement, Test wells, Computer models, Data collections, Water table, Water sampling, Path of pollutants.
Identifiers: Surface resistance, Trend surface analysis.

Evaluation of existing landfills, particularly those with the potential to affect public water supplies, is a necessary, but often time-consuming, task. A study was described in which sampling wells, test borings, electrical resistivity, and computer models were used. The importance of integrating all geohydrologic data; the usefulness of trend surface analysis, surface resistivity measurements, and computer modeling; and the value of specific conductance as a pollution indicator were emphasized. (Visocky-ISWS)
W77-03991

COAL PILE LEACHATE - QUANTITY AND QUALITY CHARACTERISTICS,
Pickard and Anderson, Auburn, N.Y.
W. C. Anderson, and M. P. Youngstrom.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 102, No EE6, Proceedings Paper 12626, p 1239-1253, December 1976. 10 fig, 3 tab, 7 ref, 1 append.

Descriptors: *Leachate, *Coal mine wastes, *New York, Acid mine water, Waste water(Pollution), Pollutants, Design, Environmental engineering, Industrial wastes, Thermal powerplants, Electric power, Runoff, Utilities, Water pollution sources, Base flow, Groundwater, On-site data collections, Water quality, *Monitoring, *Path of pollutants.
Identifiers: *Coal piles, Stockpiles.

A detailed monitoring of an existing coal pile at Ithaca, New York, was performed to determine coal pile leachate (CPL) quantity and quality variations. The total quantity of CPL generated consists of two components, base flow and surface flow. During periods of no precipitation, retained moisture within the coal pile dissolves minerals that are flushed from the pile by precipitation. Following the first flush, only minor concentration of minerals are carried from the pile in continuing CPL flows. This is particularly true of total iron, copper, manganese, chromium, and zinc. The CPL pH was found to be generally stable. CPL design quantity and quality parameters can be developed

following the collection of sufficient monitoring data for each specific site in order (1) to permit development of flow and primary contaminant hydrographs which describe the flush phenomena, and (2) to permit determination of base flow rates and minimum contaminant concentrations. (Visocky-ISWS)
W77-03992

CURRENT PROBLEMS OF HYGIENIC STANDARDIZATION OF NEW CHEMICAL SUBSTANCES, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
For primary bibliographic entry see Field 5C.
W77-04015

NONPOINT SOURCES OF POLLUTION: A FEDERAL PERSPECTIVE,
Environmental Protection Agency, Washington, D. C. Div. of Water Planning.
For primary bibliographic entry see Field 5G.
W77-04017

IRON TRANSPORT IN A LAKE TAHOE TRIBUTARY AND ITS POTENTIAL INFLUENCE UPON PHYTOPLANKTON GROWTH,
California Univ., Richmond. Sanitary Engineering Research Lab.
J. F. Elder, K. E. Osborn, and C. R. Goldman.
Water Research, Vol. 10, 1976. p. 783-787, 1 tab., 4 fig., 21 ref.

Descriptors: *Iron, Metals, *Trace elements, Eutrophication, Aquatic algae, Limnology, Nutrients, Primary productivity, Water quality, Analytical techniques, *Phytplankton, California, Nevada.
Identifiers: *Ion transport, Lake Tahoe(Calif-Nev), *Ward Creek(Calif).

Water from Ward Creek, a tributary of Lake Tahoe, California-Nevada, was analyzed for iron content from October 1972 to April 1974. Two analytical techniques were used: a bathophenanthroline colorimetric method which produced total iron data, and X-ray fluorescence which produced total iron data, and X-ray fluorescence which permitted separate determinations of dissolved and particulate iron. Iron concentrations show marked seasonal variability. The total iron transport during a one-year period in 1972-73 was approximately 6000 kg or 0.2% of the total iron content of Lake Tahoe. Most iron in stream water of the Lake Tahoe basin results from erosion, producing a high predominance of particulate forms. Because of the possiblity of various breakdown mechanisms, this iron is potentially stimulatory to algal growth in the lake. (Katz)
W77-04022

CONCENTRATION OF POLYVALENT METALS BY SEAWEEDS IN VOSTOK BAY, SEA OF JAPAN,
Akademiya Nauk SSSR, Vladivostok.
For primary bibliographic entry see Field 5C.
W77-04023

HIGH SEAS OIL POLLUTION: PARTICULATE PETROLEUM RESIDUES IN THE NORTH ATLANTIC,
Bedford Inst. of Oceanography, Darmouth (Nova Scotia).
E. M. Levy, and A. Walter.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976), p. 2781-2791, 5 tab., 9 fig., 15 ref.

Descriptors: Oil *Oil pollution, Oil spills, Water pollution, Solid wastes, Water pollution sources, Transportation, Navigation, Atlantic Ocean, Canada, Path of pollutants.
Identifiers: Particulate petroleum residues, Tar balls, North Atlantic Ocean, Gulf Stream, North Atlantic Current System, Shipping, Tanker traffic.

The results of a continuing invetigation into the occurrence and distribution of particulate petroleum residues on the surface of the North Atlantic are presented. From 1971 to 1974 more than 850 samples were cllected from the North Atlantic on transects between the east coast of Canada and South America, the Caribbean, Baffin Bay and surrounding waters, the Labrador Sea, and the Azores. Repeated sampling was carried out in the Gulf of St. Lawrence and the region between Nova Scotia and Bermuda. The results indicate that the waters nort of the Gulf Stream-North Atlantic Current system were virtually free from floating petroleum residues, while the waters of the Gulf Stream Sargasso Sea, and Caribbean Sea were much more heavily polluteed. Slthough concentrations as high as 91.8 mg/m2 were encountered, the general level of pollution was much less with tar contents in suthen waters following a log-normal distribution with a geometric mean of 0.16 mg/m2. The geographical distribution of tar is interpreted in terms of inputs from shipping and tanker traffic, and surface circulation patterns. (Katz)
W77-04025

THE KINETICS OF ACCUMULATION AND EXCRETION OF FERRIC HYDROXIDE IN MYTILUS EDULIS (L.) AND ITS DISTRIBUTION IN THE TISSUES,
Institute of Marine Biochemistry, Aberdeen (Scotland).
For primary bibliographic entry see Field 5C.
W77-04028

ARSENIC CONCENTRATIONS IN SOME COEXISTING MARINE ORGANISMS FROM NEWFOUNDLAND AND LABRADOR,
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 5C.
W77-04036

WEED CONTROL AND THE ENVIRONMENT, (IN FRENCH),
Organisation Europeenne et Medterraneenne pour la Protection des Plantes.
G. Mathys.
Bull Oepp (Organ Eur Mediterr Prot Plant 5(2), p 87-100, 1975.

Descriptors: *Aquatic weed control, *Herbicides, Water pollution sources, Toxicity, *Path of pollutants, *Soils, Environment, Pesticide residues, Ureas.
Identifiers: *Germany.

In the Federal Republic of Germany, the use of 7 herbicides was restricted in 1974 mainly on the grounds of their potentials as water pollutants. The 13 herbicides which had the highest acute toxicity to rats are discussed. Fodder plants may contain more residues than those destined for human consumption, as in the case of cereals. There is little evidence of accumulation in human and animal tissues, except for fish in which diuron and its metabolite 3,4-dichloraniline accumulates. Birds exposed to relatively high concentrations of various herbicides showed considerable resistance, but aquatic herbicides had a substantial impact on the composition of the water fauna and flora. Special attention was given to the fate of herbicides in soil. The principal pathways of inactivation are discussed and the Freundlich formula used to calculate the degree of adsorption is given. Most herbicides are subjected to degradation by microorganisms, most of which have been identified. In consideration of many factors interfering in these processes and the role played by weather conditions, any attempt at evaluating the life-time and fate of the compounds remains uncertain. Nevertheless, an approximation of the persistence can be established. The effect of 5 substituted urea herbicides on the soil microflora, when applied at high concentrations and measured in terms of CO2 production, was discussed. This review indicates that herbicides are not likely to present real hazards, providing that certain compounds do not reach aquatic systems.--Biological Abstracts, Inc.
W77-04041

THE CONDITIONS FOR BIODEGRADATION OF PETROLEUM HYDROCARBONS AT SEA,
Aix-Marseille-3 Univ. (France). Laboratoire de Microbiologie.
S. Tagger, L. DeVeze, and J. Le Petit.
Marine Pollution Bulletin, Vol. 7, No. 9, September 1976, p 172-174, 2 fig, 6 ref.

Descriptors: Oil, *Oil pollution, Oil wastes, *Biodegradation, *Microbial degradation, Aquatic, *Microbiology, Digestion, Seawater, Industrial wastes, Effluents, Oil wastes, Water pollution.
Identifiers: *Petroleum biodegradation, Petroleum hydrocarbons, Marine bacteria, Petroleum refinery, Bacterial activity, Oil refinery effluent.

The hydrocarbon degradation potential of seawater appears higher in zones chronically polluted by these materials; they are characterized by an abundant bacterial development. The salinity of the effluent from a refinery and also its hydrocarbon content are factors affecting the speed of degradation. (Katz)
W77-04042

ACCUMULATION AND RELEASE OF PETROLEUM-DERIVED AROMATIC HYDROCARBONS BY FOUR SPECIES OF MARINE ANIMALS,
Texas A and M Univ. College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W77-04045

DISTRIBUTION AND ABUNDANCE OF HEAVY METALS IN FINFISH, INVERTEBRATES AND SEDIMENTS COLLECTED AT A DEEP WATER DISPOSAL SITE,
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Lab.; and National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
R. A. Greig, D. R. Wenzloff, and J. B. Pearce.
Marine Pollution Bulletin, Vol. 7(10), Oct., 1976, p. 185-187, 2 tab., 9 ref.

Descriptors: Marine fish, *Heavy metals, Cadmium, Copper, Nickel, Zinc, Mercury, Crab, Chromium, Silver, Crustaceans, Arsenic compounds, Lead, Atlantic Ocean, New York, Monitoring, Sewage disposal, *Path of pollutant, *Distribution, Baseline studies.
Identifiers: *New York Bight, Deepwater disposal, Tissue concentration of metals.

Analyses of deep water finfish to several heavy metals indicate that deep water fish have less metal in muscle tissue than do fish taken from the continental shelf. Liver tissue from deep water fish also, generally, contain less metals. Sediments and a single invertebrate collected at deep water stations have also been analyzed for heavy metals. (Katz)
W77-04046

HYDROCARBONS IN A WILDERNESS LAKE,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
P. K. Starnes, and R. A. Brown.
Marine Pollution Bulletin, Vol. 7(7), 1976, p. 131-132.

Descriptors: *Oil, Carbon cycle, Spectrophotometry, Freshwater, Surface waters, Water quality, Limnology, Analytical techniques, Gas chromatography, *Canada, *Organic compounds, *Pollutant identification.
Identifiers: *Ontario, *Green Lake(Ont), Gas chromatographic trace, *Hydrocarbon traces, Natural hydrocarbons.

Hydrocarbons found in Green Lake, Ontario, Canada, are believed to be of natural origin coming from plant and animal organisms. (Katz)
W77-04048

MOLECULAR TEST FOR OIL POLLUTION IN SURFACE SEDIMENTS,
Strasbourg Univ. (France). Institut de Chimie.
M. Dastillung, and P. Albrecht.
Marine Pollution Bulletin, Vol. 7(1), January, 1976, p. 13-15, 3 fig., 20 ref.

Descriptors: Oil, Oil spills, *Oil pollution, Water pollution, *Sediments, Analytical methods, Chromatography, Laboratory tests, Sea water, *Pollutant identification, Gas chromatography, *Distribution, Path of pollutants.
Identifiers: Polycyclic biological markings, Pentacyclic triterpanes, Crude oil pollution, Surface sediments, Gas chromatogram, France.

Polycyclic biological markers, such as pentacyclic triterpanes, can be useful as 'molecular markers' in the study of crude oil pollution problems. This has been shown in the case of a weakly polluted surface sediment from the west coast of France. The use of these markers is based on the differences in their distribution, which depend on the degree of maturity of the geological sources. (Katz)
W77-04058

DISTRIBUTION OF HEAVY METALS IN TISSUES OF THE COMMON SEAL,
Liverpool Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W77-04059

AN ASSESSMENT OF THE POLLUTION OF CORNISH COASTAL WATERS,
Atkins Research and Development, Epson (England).
R. E. N. Bradfield, R. W. S. M. Kingbury, and C. P. Rees.
Marine Pollution Bulletin, Vol. 7(10), Oct. 1976, p. 187-193, 3 tab., 6 fig.

Descriptors: Water pollution, Water pollution effects, Seawater, Water analysis, Water chemistry, Heavy metals, Marine algae, Marine plants, Benthic fauna, Benthic flora, Sewage, *Monitoring, Mine wastes, *Baseline studies, Pollutant identification.
Identifiers: *Cornwall coast(U.K.), Brown seaweed, Fucus vesiculosus, Water quality monitoring, Seaweed sampling stations.

A detailed survey of pollution was undertaken in five areas around the Cornwall coast in south-west England, at St. Austell and Mevagissey Bays, Falmouth Bay, Mounts Bay, St. Ives Bay and Portreath. The aim of the study was to establish baseline values against which subsequent changes could be detected and their importance evaluated. Three major investigations were undertaken in each area involving seawater sampling and analysis, heavy metal analysis of seaweed specimens and quantitative surveys of intertidal fauna and flora. In general, the areas studied showed few signs of being exposed to significant levels of industrial or sewage pollution. (Katz)
W77-04061

RADIOECOLOGICAL STUDY OF CHAROPHYTA, (IN RUSSIAN),
Akademiya Nauk Litovskoi, SSR, Vilnius. Inst. of Botany.
For primary bibliographic entry see Field 5C.
W77-04068

A STUDY ON THE INFLUENCE OF SALINITY FLUCTUATIONS UPON THE BACTERIAL FLORA OF THE LAGOON CIENAGA GRADE DE SANTE MARTA (COLOMBIA) AND THE ADJACENT COASTAL REGION, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
R. Jeske.
Kiel Meeresforsch 31(1), p 7-16, 1975.

Descriptors: *Salinity, *Bacteria, *Lagoons, Coasts, *Brackish water, Nutrients, Pigments, Hydrogen ion concentration, Water temperature, South America, Aquatic plants.
Identifiers: Agar, *Agrobacterium-stellulatum, Cienaga-Grande-de-Santa-Marta, *Columbia, Halophiles.

In the tropical brackish water lagoon Cienaga Grande de Santa Marta, the change of the bacterial population was studied during a period of dropping salinity from Sept.-Dec. 1973. Plate counts on ZoBell's Medium 2216 E with different salinities were made from a series of 11 sections through the lagoon, and compared with the salinity, temperature and pH of the water. Following the decrease of salinity, a mass development of halophilic bacteria can be observed. They decrease again at a salinity about 3%, while the fresh water bacteria reach their maximum. This group made up only 0.1-3.7% of the bacterial flora in the salinity range above 10%. Among the halophilic bacteria a brown pigmented organism occurs, while resembles Agrobacterium stellulatum, the most common brackish water bacterium of the Baltic Sea. Before the maximal increase of the fresh water bacteria, a pink colored population of halotelerant aquatic bacteria temporarily appears. As in the lagoon, the fresh water inflow influences the salinity and bacterial content in the adjacent coastal region. On a profile from the mouth of the Cienaga seaward the number of halophilic bacteria in the surface layer decreases within 11 nautical miles from 90,000 cfu colony-forming units/ml to 60-70 cfu/ml, that of fresh water from 2100 cfu/ml to 20-50 cfu/ml. The fresh water originates mainly from the Rio Magdalena. Between the mouth of the Magdalena and Santa Marta the surface samples show a terrestrial influence. The halophilic bacteria are most numerous with the shallow stations of high nutrient content and decrease with increasing distance from the coast. With the water of the river M Magdalena, halotolerant fresh water bacteria are transported to the surface layer of the bight, especially the pink organism which was found to be frequent in the Cienaga. In the surface water of Santa Marta the plate counts on sea water agar range from 390-20,500 cfu/ml, those on fresh water agar from 68-12,000 cfu/ml. The highest numbers coincide with the inflow of fresh water. The bacterial counts of the 10 mm samples make up about 10% of the surface values.--Copyright 1976, Biological Abstracts, Inc.
W77-04076

WATER POLLUTION OF THE RIVERS FLOWING EASTWARDS INTO THE BAY OF ISE, (IN JAPANESE),
R. Ota.
Jpn J Limnol 36(4), p 160-163, 1975.

Descriptors: Bays, Asia, Water pollution sources, *Phosphates, Rivers, *Nitrates, Organic matter, Path of pollutants.
Identifiers: *Ise Bay(Japan), *Japan.

From May-Oct. 1973, chemical analyses of the water of 11 main rivers flowing into Ise Bay, Japan, were performed 3 times. PO4-P,NH4-N,NO3-N and organic-N are tabulated. The Tenpaku, Shidomo and Seta rivers flowing through the city containing organic substances in higher concentrations derived mostly from urban sewage. The Inobe, Asake and Miya rivers flowing in the garden city are relatively natural.--Copyright 1976, Biological Abstracts, Inc.
W77-04080

BACTERIAL ASSIMILATION OF ORGANIC MATTER IN WATERS WITH VARIOUS POLLUTION LEVELS, (IN RUSSIAN),
M. V. Fursenko.
Mikrobiologiya 44(3), p 505-510, 1975.

Descriptors: *Bacteria, *Organic matter, Water pollution, *Waste assimilative capacity.
Identifiers: Glucose, *Bacterial asimilation.

The assimilation of organic matter by bacteria is more intensive in polluted water. The maximal glucose assimiliation rate depended on the number of bacteria and appeared to be 2 times higher in polluted water and > 100 times higher in extremely polluted water in comparison with clean water. An equation for the dependence of the maximal assimiliation rate on the total number of bacteria in natural populations is suggested.--Copyright 1976, Biological Abstracts, Inc.
W77-04081

5C. Effects Of Pollution

CHANGE OF BIOCENOSES IN ARTIFICIAL BODIES OF WATER DUE TO HUMAN INTERVENTION, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR). Research Inst. of Biology.
V. M. Kruglova.
Izv Sev-Kavk Nauchn Tsentra Vyssh Shk Estestv Nauki 3(3); p 55-57, 1975.

Descriptors: *Invertebrates, *Growth rates Fish, Water pollution effects, Bodies of water, Artificial lakes, Shrimp, Mollusks, Reservoirs, *Fish food organisms.
Identifiers: *Biocenses, Opossum, Polychaetes.

The introduction and acclimation of invertebrates (opossum shrimp, polychaetes, mollusks, etc.) for fish food and their dispersal throughout reservoirs have an effect on the growth of fishes, the appearance of new commercial fish species, and the ratio of commercial species in catches.--Copyright 1976, Biological Abstracts, Inc.
W77-03618

THERMAL EFFECTS ON AQUATIC ORGANISMS, ANNOTATED BIBLIOGRAPHY OF THE 1975 LITERATURE.
Oak Ridge National Lab., Tenn. Ecological Sciences Information Center.
ORNL/EIS-88, October 1976, Edited and Compiled by C. C. Coutant, S. S. Talmadge, R. F. Carrier, B. N. Collier, and N. S. Dailey, 235 p. W-7405-eng-26.

Descriptors: *Environmental effects, *Bibliographies, *Temperature, Aquatic life, Indexing, Documentation, *Thermal pollution, Aquatic animals, Thermal stress.

This is the fifth in a series of scientifically indexed bibliographies concerning thermal effects on aquatic organisms. 716 references are listed and indexes are provided for author, keywords, subject category, geographic location, taxon, and title (alphabetical listing of keyword-in-context of the nontrivial words in the title). Documents in which temperature is a variable or where it is important in the experiment were included. Heat sterilization studies, laboratory studies that do not relate to the environment, and seasonal field studies with no

specific mention of temperature were not included. (ChiltoniORNL)
W77-03640

THE INFLUENCE OF TEMPERATURE ON THE BIOENERGETICS OF THE CARNIVOROUS STONEFLY NYMPH, ACRONEURIA CALIFORNIA BANKS (PLECOPTERA: PERLIDAE),
California Univ., Davis. Dept. of Water Science and Engineering; and California Univ., Davis. Ecology Graduate Group.
D. R. Heiman, and A. W. Knight.
Ecology, Vol. 56, 1975, p 105-116, 6 fig, 5 tab, 26 ref.

Descriptors: *Environmental effects, *Temperature, Energy budget, Growth rates, *Respiration, *Stoneflies, Aquatic environment, Laboratory tests, *Aquatic insects, Metabolism, Water temperature.

The study describes in quantitative terms the growth, food consumption, respiration, and egestion of the stonefly nymph, and indicates how these factors are affected by changes in water temperature. Eight constant-temperature baths were maintained at temperature increments of 2C. The experimental temperatures chosen approximated the average temperature in the field for that period, in general from four degrees below the field mean to ten degrees above. At temperatures approximating environmental levels, assimilation efficiency was approximately 86%, while gross and net growth efficiencies were 33% and 41% respectively. Metabolic losses accounted for about 50% of the food consumed. Optimal temperature ranges were concluded to be 16-22C in summer, 10-18C in fall, 6-12C in winter, and 10-16C in spring. (Chilton-ORNL)
W77-03641

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON TRANSPORT OF PERSISTENT CHEMICALS IN AQUATIC ECOSYSTEMS.
National Research Council of Canda, Ottawa (Ontario).
For primary bibliographic entry see Field 5B.
W77-03642

GEOCHEMICAL INTERACTION IN THE RECENTLY INDUSTRIALIZED STRAIT OF CANSO,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Geoscience Center; and Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Environmental Marine Geology.
For primary bibliographic entry see Field 5B.
W77-03649

TRACE METAL POLLUTION FROM A METROPOLITAN AREA: SOURCES AND ACCUMULATION IN THE LOWER FRASER RIVER AND ESTUARY,
British Columbia Univ., Vancouver. Westwater Research Centre.
For primary bibliographic entry see Field 5B.
W77-03652

TRANSPORT OF SOME ORGANOCHLORINES IN B. C. WATERS,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03653

HEAVY METALS IN THE LOWER MISSISSIPPI,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
For primary bibliographic entry see Field 5B.
W77-03654

ADSORPTION ISOTHERMS FOR THE UPTAKE OF ZINC BY CLAY MINERALS IN A FRESHWATER MEDIUM,
Washington State Univ., Pullman. Nuclear Radiation Center.
For primary bibliographic entry see Field 5B.
W77-03656

PARTITIONING AND UPTAKE OF PESTICIDES IN BIOLOGICAL SYSTEMS,
Dow Chemical U. S. A., Midland, Mich.
E. E. Kenaga.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystemsheld in Ottawa, Canada May 1-3, 1974. p II-19-II-22, 65 ref.

Descriptors: *Environmental effects, Pesticides, Ecosystems, Solubility, Biomass, Adsorption, *Absorption, Water, Pollutants, Path of pollutants, *Pesticide residues, Aquatic environment.

The paper is a condensation of a full paper which appears in the American Chemical Society Advances in Chemistry Series in 1974. Comparisons were made between natural bodies of water, blood and plant sap as transporting systems for pesticides and other chemicals. Uptake and distribution of pesticides in biological systems were related to water solubility, volatility from water, adsorption to soil organic matter, plant and animal organisms in aquatic ecosystems, effects of temperature, type of flow system, route of pesticide intake, specific types of organism tissue, and ratio of biomass to surface area for sorption. From pesticide bioaccumulation data it was found that the first period of residue pickup is due to adsorption and is often related to high surface area to mass ratio of the adsorbent. If the pesticide is high in fat solubility, low in water solubility and persitent in the environment, a continued increase in residues may take place until a steady state point is reached in live organisms. Such residue pickup is by absorption and such bioaccumulation can be detected at an early stage by comparison with baseline studies. (See also W77-03642) (Chilton-ORNL)
W77-03659

WATER-SEDIMENT DISTRIBUTION OF CHLORINATED HYDROCARBON PESTICIDES IN VARIOUS ENVIRONMENTAL CONDITIONS,
Missouri Univ., Rolla. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03660

CHLORINATED HYDROCARBONS IN COASTAL MARINE ECOSYSTEMS,
Washington Univ., Seattle. Dept. of Oceanography.
S. P. Pavlou, R. N. Dexter, and J. R. Clayton, Jr.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-31-II-35, 3 tab, 25 ref.

Descriptors: *Environmental effects, *Organic compounds, *Chlorinated hydrocarbon pesticides, Polychlorinated biphenyls, Pollutants, Water pollution, Path of pollutants, Distribution, DDT, Water, Zooplankton, Sediments, Adsorption, *Pesticide residues.

Evaluation of the interaction of chlorinated hydrocarbons with various phases of the ecosystem is studied in terms of input mechanism, circulation characteristics, and primary productivity of the area under investigation. Considerations of transport within the ecosystem included spatial distribution and phase fractionation from ambient water. Significant variation was seen in the PCB/DDT ratio for the different phases and regions sampled. General trends showed that, for the outfall region, the total water concentrations in the plume were nearly equal, the surface particulates had accumulated 6 times as much PCB as DDT, the zooplankton had nearly the same distribution as the sludge, and the sediments were highly enriched in DDT. For the offshore region, the PCB/DDT ratio increased in all phases with the greatest increase shown by the zooplankton. It was concluded that the hydrocarbon distributions can be explained in terms of equilibrium adsorption partitioning. At low concentrations, equilibration favors the greatest portion in the water while suspended particulate matter and zooplankton accumulation is roughly proportional to the total masses of these phases. (See also W77-03642) (Chilton-ORNL)
W77-03661

MICROANALYSE DE L'INCORPORATION D'UN METAL LOURD DANS LES ECAILLES D'UN POISSON,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
For primary bibliographic entry see Field 5A.
W77-03663

DYNAMICS OF MICROBIALLY PRODUCED FULVIC MATERIAL IN AQUATIC ENVIRONMENTS RELATIVE TO DIFFERENT CONDITIONS OF TEMPERATURE AND PH,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
S. A. Visser.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-47-II-51, 5 fig, 3 ref.

Descriptors: Environmental effects, *Temperature, *Hydrogen ion concentration, *Fulvic acids, *Humic acids, Aquatic microbiology, Aquatic environment, Water pollution.

Effects are discussed of temperature and pH on changes in sterile fulvic material obtained from the microbial substrate after different incubation periods and stored under conditions of aerobiosis and darkness. Fulvic acid formation was found to consist of two consecutive processes: condensation of small molecules under conditions of alkaline pH and low temperature followed by a process to which low pH and high temperature were beneficial. The highest percentage of humic matter was found in the longest incubated substrates in an acid environment and at a high temperature. (See also W77-03642) (Chilton-ORNL)
W77-03664

DYNAMIQUE DE DEGRADATION DU PHENOL DANS LE FLEUVE SAINT-LAURENT,
Institut National de la Recherche Scientifique, Rimouski (Quebec).
For primary bibliographic entry see Field 5B.
W77-03665

MICROBIAL DEALINGS WITH HEAVY METALS,
Ottawa Univ., (Ontario). Dept. of Biology.
D. J. Kushner.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-59-II-63, 4 tab, 21 ref.

Descriptors: Environmental effects, *Mercury, Resistance, *Bacteria, Path of pollutants, Pollutants, Water pollution effects, Sediments, Fish, Microbiology, Canada, Heavy metals.
Identifiers: *Ottawa River(Canada).

Mercury resistant bacteria from water and sediment and from slime and guts of fish from the Ottawa River were investigated to determine the correlation between mercury resistance and ability to transform mercury compounds. 50% or more of

the bacteria in all compartments were resistant to 1 ppm mercury with 0.2.1% being resistant to 10 ppm of mercury. It was found that, while these bacteria could transform mercury into a volatile compound, there was no evidence for organic mercury formation. (See also W77-03642) (Chilton-ORNL)
W77-03666

MERCURY AND MERCURIAL RESISTANCE DETERMINED BY PLASMIDS IN ESCHERICHIA COLI AND PSEUDOMONAS AERUGINOSA,
Washington Univ., St. Louis, Mo. Dept. of Biology.
J. Schottel, A. Mandal, K. Toth, D. Clark, and S. Silver.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p II-65-II-71, 5 fig, 1 tab, 23 ref.

Descriptors: Environmental effects, *Mercury, Resistance, *Bacteria, *E. coli, Pseudomonas, Water pollution effects.
Identifiers: *Plasmids, *Pseudomonas aeruginosa.

It has been found that mercury and mercurial resistance in bacteria is associated with the presence of extra-chromasomal plasmids. The present study is concerned with these plasmids in E. coli and P. aeruginosa. More than half of the cases studied showed that mercury resistance was associated with the ability to volatilize mercury. The enzyme systems responsible are soluble rather than membrane bound and are produced only after induction of the cells by exposure to any of a variety of mercurials. (See also W77-03642) (Chilton-ORNL)
W77-03667

THE ROLE OF TIN IN BACTERIAL METHYLATION OF MERCURY,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03668

TRANSPORT AND DISTRIBUTION OF MERCURY IN SEDIMENTS,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5B.
W77-03669

BACTERIAL MOBILIZATION OF MERCURY IN CHESAPEAKE BAY,
Maryland Univ., College Park. Dept. of Microbiology.
R. R. Colwell, and J. D. Nelson, Jr.
In: Proceedings of the Inernational Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-1-III-10, 5 fig, 1 tab, 8 ref.

Descriptors: Environmental effects, *Water pollution, Pollutants, *Mercury, *Bacteria, Plankton, Sediments, Water, *Chesapeake Bay, Food chains, Estuaries.

Data showed that the total number of mercury-resistant bacteria in a given sampling site provides an index of microbiological mercury transformation. Larger numbers of mercury resistant populations were found associated with plankton than with water or sediments. In water and sediments mercury-resistant bacteria were found to be distributed non-uniformly between different particle size fractions. It was concluded that bacteria play a major role in the mobilization of mercury in estuaries and coastal waters. Mecury-resistant bacteria take up mercury and pass it on through the food chain. (See also W77-03642) (Chilton-ORNL)
W77-03670

INTERACTION BETWEEN AQUATIC PLANTS AND RIVER BED SEDIMENTS IN THE UPTAKE OF MERCURY FROM FLOWING WATER,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
D. C. Mortimer, and A. Kudo.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-11-III-15, 6 fig, 4 tab.

Descriptors: Environmental effects, *Laboratory tests, *Mercury, Chemical reactions, Sediments, Aquatic plants, Running waters, Lotic environment, Water pollution effects.

Aquaria were set up with plants growing in bed sediments and in glass beads in a 24 day controlled, flowing water experiment. Varying concentrations of mercuric chloride and methyl mercuric chloride were continuously metered into the input water to yield aquarium levels of 0.2, 2, and 10 micro g/l. Results showed that there was no significant difference in the uptake rate between mercuric chloride and methyl mercuric chloride and that uptake was proportional to water concentration. Methyl mercury was more toxic to plants than inorganic mercury. Plants growing in sediments absorbed less mercury than those growing in glass beads. The aquarium walls were the largest absorbing compartment in the system with methyl mercury being absorbed more strongly that inorganic mercury. (See also W77-03642) (Chilton-ORNL)
W77-03671

LEAD TRANSPORT IN A RIVER ECOSYSTEM,
Illinois Univ. at Urbana-Champain. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03672

THE FORM OF MERCURY IN FRESHWATER FISH,
Ontario Ministry of the Environment, Toronto. Inorganic Trace Contaminants Lab.
For primary bibliographic entry see Field 5A.
W77-03673

ORIGIN AND FATE OF MERCURY COMPOUNDS IN FISH,
National Research Council of Canada, Ottawa(Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03674

THE WAYS OF TRANSPORT OF MERCURY TO FISH,
National Swedish Environment Protection Board, Stockholm. Research Lab.
For primary bibliographic entry see Field 5B.
W77-03675

TIME AND SPACE DEPENDENCE OF POLLUTANT LEVELS IN AQUATIC BIOTA, FIELD STUDIES,
Naturhistoriska Riksmuseet, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-03676

TRENDS OF PCB AND DDT IN FISH AND AQUATIC BIRDS,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5B.
W77-03677

MERCURY EFFECTS ON SWIMMING AND METABOLISM OF TROUT,
Fisheries and Marine Service, Winnipeg (Manitoba).
D. G. Alexander.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p III-65-III-69, 4 fig, 13 ref.

Descriptors: Environmental effects, *Water pollution effects, *Rainbow trout, *Mercury, *Respiration, *Fish behavior, *Metabolism, Lethal limit, Toxicity.

Sublethal effects of mercury on rainbow trout (Salmo gairdneri) were measured by swimming performance and respiration. Fish were exposed for 4-6 days to 0.050, 0.100, 0.144, 0.164 mg of mercuric chloride at 15C. Data showed that active rate, fatigue velocity and scope for activity decreased significantly within the concentration range of 0.050-0.144 mg while the standard rate increased. Fatigue velocity was seen to decrease significantly with mercury concentrations in the gill and muscle. (See also W77-03642) (Chilton-ORNL)
W77-03678

COMPUTER MODELING,
National Research Council of Canada, Ottawa, (Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03679

ON REALISM AND GENERALITY OF BIO-ACCUMULATION MODELS. TOWARDS A GENERAL METHODOLOGY,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
For primary bibliographic entry see Field 5B.
W77-03680

AQUATIC FOOD CHAIN MODELS FOR ESTIMATING BIOACCUMULATION AND BIODEGRADATION OF XENOBIOTICS,
Fish and Wildlife Service, Columbia, Mo. Fish-Pesticide Research Lab.
B. T. Johnson.
In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems held in Ottawa, Canada May 1-3, 1974. p IV-17-IV-22, 2 tab, 12 ref.

Descriptors: *Model studies, *Mathematical models, Environmental effects, *Food chains, *Biodegradation, *Trophic level, DDT, Absorption.
Identifiers: *Bioaccumulation(Xenobiotics), *Xenobiotics.

Food chain models were developed to represent three aquatic trophic levels. The models simulate temperature and food chain with qualitative and quantitative information on uptake, clearing, and degradation being available at each sequence of the degradation product's movement through the chain. Measurements of direct uptake from water, uptake from food, and associated chemical changes are used to estimate relative propensity of a xenobiotic and possible degradation compounds to persist in aquatic ecosystems, as well as to estimate the rate of the materials in the environment. An accumulation index was developed which conveys the relative amount of a xenobiotic accumulation in each trophic level of the model. The index is based on DDT as a unity. (See also W77-03642) (Chilton-ORNL)
W77-03681

MATHEMATICAL MODELING OF ESTUARIAL ECOSYSTEMS,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.

W77-03682

THE OTTAWA RIVER PROJECT,
National Research Council of Canada, Ottawa (Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03683

EFFECT OF TEMPERATURE ON SEASONAL DYNAMICS OF THE NUMBER OF FECUNDITY OF LEPTODORA KINDTII (FOCKE) (CLADOCERA) IN THE REGION OF THE HEATED WATERS OF THE KONAKOVO STATE REGIONAL ELECTRIC POWER PLANT, (IN RUSSIAN),
Akademiya Nauk SSR, Moscow. Institut Biologii Vnutrennykh Vod.
A. P. Kuzichkin.
Gidrobiol Zh 11(2), p 71-75, 1975.

Descriptors: *Thermal pollution, Reservoirs, Electric powerplants, *Crustaceans, *Productivity, *Water temperature, *Heated water, Seasonal, Water pollution effects.
Identifiers: Konakovo, *Leptodora-Kindtii, *USSR(Ivankovo Reservoir).

Data are presented on the seasonal dynamics of the number of Leptodora kindtii in the Ivankovo Reservoir (USSR) in the plume of warm water discharged by the Konakovo state regional electric power plant on the Volga, the specific fecundity of parthenogenetic females, the number of eggs in a brood as a function of water temperature and on the duration of the incubation period as a function of water temperature. --Copyright 1976, Biological Abstracts, Inc.
W77-03691

THE COSTS AND EFFECTS OF CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS IN THE ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W77-03701

A MATHEMATICAL MODEL FOR WATER QUALITY EVALUATION IN THE SOUTH CAROLINA GRAND STAND,
Clemson Univ., Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03731

EFFECTS OF OIL ON THE AMPHIPOD GAMMARUS OCEANICUS,
Swedish Water and Air Pollution Research Lab., Nykoping. Baltic Sea Lab.
O. Linden.
Environmental Pollution, Vol. 10, No. 4, p. 239-250, 1976. 7 fig., 21 ref.

Descriptors: *Oil pollution, *Amphipoda, Marine animals, Water pollution effects, Growth stages, Mortality, Behavior, Growth rates, Oily water, Oil spills, Crustaceans, *Lethal limit, Toxicity.
Identifiers: *Sublethal effects, Long-term effects, Venezuela crude oil, Light fuel oil, Heavy fuel oil, *Amphipod gammarus oceanicus.

Experiments with Venezuela crude, light and heavy fuel oil on the pre-adult and adult stages of the crustacean, Gammarus oceanicus, indicate that the acute toxic level, under short time exposure, is several hundred times lower for juveniles than for adults. Heavy fuel oil seems to adhere to the animals, thus inhibiting movement; receptor cells and external glandular tissues become clogged, consequently influencing their respiration and feeding. Light fuel oil appears to be chemically toxic. Crude oil effects seem to be intermediate between those of the light and heavy oils. Long-term effects of low level oil concentrations (1:40 to 1:60) killed adult test animals within 50-62 days. Oil affects animal behavior, as manifested by increased swimming, with a disturbance of the equilibrium, and is equated with an avoidance reaction; reactions to light were also altered. The tendency to enter into the precopula stage is strongly affected, especially by light and heavy fuel oils, and the total number of larvae that hatch from exposed groups was considerably reduced. Growth of newly-hatched larvae is retarded by small amounts of oil. High mortality between the 7th and 12th day is the long-term effect of a single dose of 100 and 300 microliter/liter of crude oil. (Auen-Wisconsin)
W77-03777

SEASONAL AND SHORT-TERM VARIATIONS IN THE CONCENTRATION AND SUPPLY OF DISSOLVED ZINC TO POLLUTED AQUATIC ENVIRONMENTS,
University Coll. of Wales, Aberystwyth. Dept. of Geography; and University Coll. of Wales, Aberystwyth. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W77-03778

PRIMARY PRODUCTIVITY OF THE BENTHIC MICROALGAE IN THE CHURCHI SEA NEAR BARROW, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
G. E. M. Matheke, and R. Horner.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A010 694, Price codes: A02 in paper copy, A01 in microfiche. Journal Fisheries Research Board of Canada, Vol. 31, No. 11, p. 1779-1786, 1974. 2 fig., 1 tab., 29 ref.

Descriptors: *Primary productivity, *Cold regions, *Benthic flora, Marine algae, *Alaska, *Euglenophyta, Diatoms, Arctic ocean, Polar regions, Arctic, Seasonal, Eutrophication, Water pollution effects.
Identifiers: *Chukchi Sea, Barrow(Alaska), *Baccilariophycea, Ice algae.

The Bacillariophyceae and Euglenophyceae primary productivity in the Chukchi Sea near Barrow was estimated in situ and compared with the productivity of the phytoplankton and sea ice algae in that ecosystem. Primary productivity for the benthic microalgae was less than 0.5 mg C/sq m/hr. from February until mid-June. Following the disappearance of the ice algae, the benthic microalgae productivity increased to 1.9 mg C/sq m/hr by the end of June and to 20.7 mg C/sq m/hr by mid-July. Much of the increase was due to the growth of an Amphipleura rutilans mat. The highest productivity ranged from 2.4 to 33.0 mg C/sq m/hr. Productivity under the ice from February through the time of the ice algal bloom ranged from 0.0 to 0.6 mg C/sq m/hr. During summer the highest phytoplankton productivity was 17.6 mg C/sq m/hr at one site on August 11th and 23.8 mg C/sq m/hr at another site on August 22nd. The benthic microalga became the most important source of productivity in this nearshore ecosystem after the shorefast ice breakup and the development of the A. rutilans mat. The benthic microalgae productivity was eight times that of the ice algae and twice that of the phytoplankton, and may represent a significant source of primary productivity in that ecosystem. (Auen-Wisconsin)
W77-03782

WATER POLLUTION INVESTIGATION: DETROIT AND ST. CLAIR RIVERS.
Environmental Control Technology Corp., Ann Arbor, Mich.
For primary bibliographic entry see Field 5G.
W77-03783

A COMPENDIUM OF LAKE AND RESERVOIR DATA COLLECTED BY THE NATIONAL EUTROPHICATION SURVEY IN THE NORTHEAST AND NORTHCENTRAL UNITED STATES.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-248 894, Price codes: A10 in paper copy, A01 in microfiche. Working Paper No. 474, November 1975. 211 p. 1BA029.

Descriptors: *Data collections, *Eutrophication, *Lakes, *Northeast U.S., *Central U.S., Reservoirs, Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Rhode Island, Vermont, Wisconsin, Trophic level, Impoundments.

The trophic level of nearly 200 lakes and impoundments in Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Rhode Island, Vermont and Wisconsin is defined. The trophic condition is based on the following parametric data: (1) Morphometry, including lake type (natural or impoundment), drainage area, surface area, mean depth, total inflow (in cu m/s), and retention time; (2) Physical and chemical characteristics, including median alkalinity and conductivity, mean Secchi disc, median total phosphorus, median dissolved phosphorus, median inorganic nitrogen and median total nitrogen, all in mg/l; (3) Biological characteristics, including mean chlorophyll-a, algal assay control yield (mg/l-dry weight), limiting nutrient and summary of phytoplankton data; (4) Nutrient loading characteristics, including input, municipal, industrial and septic tanks point sources, non-point sources, total loading (kg/yr), lake surface area loading rate (g/sq m/yr), output and retention; and (5) Non-point source nutrient export, including mean flow (cm/s), drainage area (sq km), mean total phosphorus, mean total nitrogen, total phosphorus export, and total nitrogen exports (in kg/sq km yr). Each water body is identified by name, state, principal county, its related trophic condition, STORET number, and NTIS accession number of each related working paper in which data collection procedures are detailed. (Auen-Wisconsin)
W77-03784

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5A.
W77-03785

EFFECTS OF PULP MILL EFFLUENT ON PHYTOPLANKTON PRODUCTION IN COASTAL MARINE WATERS OF BRITISH COLUMBIA,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
J. G. Stockner, and D. D. Cliff.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 11, p 2433-2442, November, 1976. 8 fig, 18 ref, 3 tab.

Descriptors: *Pulp wastes, *Phytoplankton, *Water pollution effects, *Canada, *Sea water, Industrial wastes, Water pollution sources, Aquatic life, Marine life, Plankton, Effluents, Pulp and paper industry, Aquatic microorganisms, Chlorophyll, Toxicity, Hydrogen ion concentration.
Identifiers: *Howe Sound(British Columbia), Kraft mills, Skeletonema costatum, Thalassiosira.

Phytoplankton production adjacent to two kraft pulp mills in Howe Sound, British Columbia, was considerably lower than daily rates at control stations removed from the zone of influence. Average daily production at the Port Mellon mill was 29 and 24 mg C/sq m/day in 1973 and 1974, in

contrast with 332 and 367, in respective years at the control. Less difference in production was seen between the Woodfibre mill and its control, because this mill is situated in a more actively flushed location. Howe Sound studies showed little qualitative or quantitative difference between chlorophyll 'a' levels or phytoplankton assemblages among mill and control stations. Skeletonema costatum and Thalassiosira spp. were dominant phytoplankton species. Light attenuation and selective absorption of 400-500 nm wavelength light by kraft mill effluent was considered the major responsible for reduced production in the zone of influence. Axenic culture studies with marine phytoplankton showed that phytoplankicity occurs only at high effluent concentrations. Laboratory experiments suggest that, given sufficient time, it is possible for phytoplankton to adapt to relatively high effluent concentrations, if pH remains normal. (Witt-IPC)
W77-03797

MARINE PHYTOPLANKTON GROWTH IN HIGH CONCENTRATIONS OF PULP MILL EFFLUENT,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
J. G. Stockner, and A. C. Costella.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 12, p 2758-2765, December, 1976. 3 fig, 9 ref, 3 tab.

Descriptors: *Pulp wastes, *Phytoplankton, *Water pollution effects, Wastes, Water pollution sources, Aquatic life, Marine life, Plankton, Effluents, Pulp and paper industry, Aquatic microorganisms, Industrial wastes.
Identifiers: Kraft mills, Newsprint mills, Skeletonema costatum, Dunaliella tertiolecta, Amphidinium carteri.

Axenic culture studies with the marine phytoplankton Skeletonema costatum, Dunaliella tertiolecta, and Amphidinium carteri demonstrated the ability of these species to adapt to and exhibit normal growth in relatively high concentrations of pulp mill effluent. Skeletonema costatum and A. carteri required a preadaptation period prior to commencement of exponential growth in high concentrations of kraft effluent (20-30%), while D. tertiolecta exponential growth in 90% kraft effluent with no requirement for preadaptation. Of six pulp mill effluent types tested, kraft was considered most inhibitory to growth, while combined kraft and newsprint effluent passed through an XAD-8 resin column was least inhibitory. The effects of the six effluent types on lag, exponential, and stationary growth phases are discussed in relation to in situ concentrations and relative ecological significance in the coastal marine environment. (Witt-IPC)
W77-03798

AQUEOUS LEACHATE FROM WESTERN RED CEDAR: EFFECTS ON SOME AQUATIC ORGANISMS,
Washington Univ., Seattle, Coll. of Fisheries.
G. B. Peters, H. J. Dawson, B. F. Hrutfiord, and R. R. Whitney.
Journal of the Fisheries Research Board of Canada, Vol. 33, No. 12, p 2703-2709, December, 1976. 5 fig, 13 ref, 2 tab.

Descriptors: *Water pollution effects, *Aquatic life, *Toxicity, Salmon, Aquatic animals, Water pollution sources, Water pollution, Leachate, Landfills, Lumbering, Wood wastes, Mortality, Fish, Salmonids, Bark, Organic compounds, Bioassay, Pollutant identification.
Identifiers: *Wood extractives, *Western redcedar(Thuja plicata), Coho salmon(Oncorhynchus kisutch), Lignans, Terpenes, Tropolones.

Water-soluble extractives from western red-cedar (Thuja plicata) heartwood, bark and foliage were investigated for their toxicity to aquatic organisms. The heartwood lignans and bark extractives were found to be moderately toxic, but the foliage terpenes and heartwood tropolones were more toxic, causing 50% mortality to coho salmon (Oncorhynchus kisutch) fry at 0.33 and 2.7 mg/liter, respectively. Tropolones were significantly less toxic to invertebrates than to free-swimming stages of the fish tested. Fry were found to be the stage of development of coho salmon most sensitive to tropolones, and eyed eggs the least sensitive. Sensitivity of the coho fry to tropolones was moderated by previous sublethal exposure or the presence of a chelatable cation. Results from field studies and a leaching study indicate that directly releasing cedar leachate from landfills or allowing logging debris to enter streams should be avoided. (Witt-IPC)
W77-03799

EUTROPHICATION AND FISH TOXICITY POTENTIALS IN A MULTIPLE-USE SUBTROPICAL RESERVOIR,
Hawaii Univ., Honolulu. Water Resources Research Center.
R. H. F. Young, G. L. Dugan, L. Lau, and H. Yamauchi.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 089, Price codes: A09 in paper copy, A01 in microfiche. Technical Report No. 89, July 1975. 175 p, 61 fig, 41 tab, 72 ref, 2 append.

Descriptors: *Sewage effluents, Water quality, *Sediments, Bioassay, Low flow, Phosphorus, *Hawaii, Nitrogen, Waste water treatment, Sewage treatment, *Eutrophication, Waste disposal, *Toxicity, Reservoirs.
Identifiers: *Algal growth potential, *Wahiawa Reservoir(HI), Wahiawa Sewage Treatment Plant, Whitmore Village Sewage Treatment Plant, Ku Tree Reservoir, Oahu.

The impact of secondary-treated effluents from the Wahiawa and Whitmore Sewage Treatment Plants on the Wahiawa Reservoir, Oahu, was investigated in terms of water and sediment quality, algal growth potential, and fish toxicity. Reservoir and waste water management alternatives were investigated based on these environmental inputs and preliminary estimates of costs and benefits of the alternatives. Nitrogen and phosphorus resulting from the discharges were determined to be responsible for seasonal stresses on both the water quality and fishes. The two most feasible alternatives for improving the situation were reuse of secondary effluent for sugarcane irrigation and seasonal tertiary waste water treatment with the latter being the more favored of the two.
W77-03825

THE DECOMPOSITION OF LEAVES IN TWO SOUTHERN CALIFORNIA STREAMS,
California Univ., Santa Barbara. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03829

CONCENTRATION OF ORGANIC SUBSTANCES IN WATER AS A FACTOR CONTROLLING THE OCCURRENCE OF SOME CILIATE SPECIES,
Ceskoslovenska Akademie Ved, Prague. Hydrobiologicka Laborator.
M. Legner.
Int Rev Gesamten Hydrobiol 60(5), p 639-654, 1975.

Descriptors: *Ciliates, *Organic wastes, Organic compounds, *Organic matter, Reservoirs, Rivers, Industrial wastes, Water pollution effects.
Identifiers: *Glucose, *Peptone.

A description of 7 experiments on the development of ciliate populations in samples from a river and 2 reservoirs is given. The samples were alternatively supplemented by various amounts of organic material and incubated at 20C. The succession of ciliate species was followed for 1-4 wk. Different initial concentrations of the same organic material promoted the development of different species. After the addition of small amounts of organics the species sequence varied considerably; the addition of larger amounts was followed by higher individual counts and a fairly reproducible species sequence. When the usually dominant species were not present in the inoculum, the respective period passed without the presence of any ciliates. The sequence of the species was almost identical in the parts of the same sample supplemented by either glucose or peptone.--Copyright 1976, Biological Abstracts, Inc.
W77-03839

WATERFOWL AND ACID PRECIPITATION IN NORWAY, (IN DANISH),
Zoologisk Museum, Oslo (Norway).
H. M. K. Lund.
Fauna (OSLO) 28(4), p 224-225, 1975.

Descriptors: *Waterfowl, Fish, Invertebrates, Water pollution, *Air pollution, Forests, Precipitation(Atmospheric), Zinc, Lead, Sulfur compounds, Industrial wastes.
Identifiers: *Acid precipitation, *Norway.

The precipitation over Scandinavia during the last few decades has brought increasing amounts of airborne pollutants, SO2, Zn and Pb, from industrial areas in western and central Europe. These contaminants have killed fish and invertebrates in mountain lakes in S. Norway. In 1972 the Norwegian Ministry of Environment started a research project concerning the effect of this 'acid' precipitation on forests and fish. Including Tetraonidae in the project is being considered. The consequences of the acidification of lakes and rivers on waterfowl should be included in the project.--Copyright 1976, Biological Abstracts, Inc.
W77-03841

EFFECT OF VARIOUS FACTORS ON GLUCOSE DECOMPOSITION RATE IN NATURAL WATERS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
B. I. Nabivanets, I. G. Garasevich, and V. I. Kachan.
Gidrobiol Zh 11(4), p 17-25, 1975.

Descriptors: Water pollution effects, *Dissolved oxygen, *Degradation(Decomposition), Salts, Decomposing organic matter, Microorganisms.
Identifiers: *Glucose, Heterotrophic organisms.

The amount of O2 dissolved in water (1.5-9 mg/l) has no influence on the rate of glucose disappearance and only its complete absence results in 3-fold growth of the rate constant. Introduction of great amounts of biogens into the water produces a 5-10 fold growth in the reaction rate constant and an increase in concentration of dissolved salts yields only a 1.5-2-fold increase in the constant. The number of heterotrophic organisms has a decisive influence on the process rate; the constant value is proportional to their number at the start of the experiment.--Copyright 1976, Biological Abstracts, Inc.
W77-03862

THE EFFECTS OF FRESHWATER INFLOWS ON HYDROLOGICAL AND BIOLOGICAL PARAMETERS IN THE SAN ANTONIO BAY SYSTEM, TEXAS,
Texas Parks and Wildlife Dept., Austin. Coastal Fisheries Branch.
For primary bibliographic entry see Field 2L.
W77-03897

A ZERO-RELATIVE-VELOCITY BELT SKIMMER,
Shell Development Co., Houston, Tex. Pipelne Research and Development Lab.
R. R. Ayers, K. L. Bickham, J. Fraser, and P. E. Titus.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-014 497, Price codes: A11 in paper copy, A01 in microfiche. U. S. Costal Guard Office of Research and Development, Report No. CG-D-116-75, April 1975. 246 p, 9 ref, 6 append. DOT-CG-42229-A.

Descriptors: *Oil spills,l *Oil pollution, *Water pollution control, Equipment, *Skimming, Pollution abatement, *Separation techniques.
Identifiers: Oil recovery systems, Belt skimmers.

A feasibility study was conducted on a zero relative velocity (ZRV) belt skimming concept for use in currents up to 10 knots. Conclusions from the study follow: The feasibility studies indicate that further development of hardware is warranted by the protected oil collection performance. A composite belt of Astroturf and Fuetron felt can rapidly sorb oils having viscosities ranging from light diesel to No. 6 fuel oil. The composite belt, loosely drapped on the water's surface for 40 to 50 feet of contact length, can imbibe and withdraw large quantities of oil under ZRV conditions at 10 knots. Oil is extracted from the belt by mechanical wringing. Tests of full scale simulations of the belt and wringer action show maximum oil recovery rates between 1016 gpm and 2152 pgm for an eight-foot-wide belt at a speed of 6.8 knots. Debris does not appreciably affect the ZRV belt skimmer because most of it will pass ulnder the belt. The effects of waves on performance are minimized because the sorbent belt is compliant. (Sinha-OEIS)
W77-03899

ANALYSIS OF POLLUTION FROM MARINE ENGINES AND EFFECTS ON THE ENVIRONMENT. SOUTHERN LAKES,
Environmental Science and Engineering, Inc., Gainesville, Fla.
H. L. Davis, and K. D. Wilson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 176, Price codes: A11 in paper copy, A01 in microfiche. Environmental Protection Agency, Environmental Protection Technology Series, No. EPA-670/2-75-063, June 1975. 242 p, 14 fig, 57 tab, 58 ref. R-801799.

Descriptors: *Florida, *Water pollution effects, *Oil pollution, *Biological communities, *Water quality, *Environmental effects, *Baseline studies, Monitoring, Benthos, Aquatic plants, Ecosystems, Grasses, Lead, Fishes.
Identifiers: Leaded fuel Marine engines, Outboard motor emissions.

The effects of two-cycle outboard engine emission on Florida lakes using leaded fuel and drained and drainless engines were studied. Field investigations were performed in three natural lakes of 2 to 10 acres near Gainesville, Florida. One lake was treated with 'drainless' engines and one with engines which 'drained' unburned fuel into the water. The third lake served as a control. Biological components and water quality conditions in the three lakes were monitored by routine standard procedures for a time period of 18 months during which motors were operated at the rate of 2.4 gallons of fuel per million gallons of water per day. During the course of the field investigation, there was no overt evidence of any significant effect of motor emissions on the benthic macroinvertebrates, phytoplankton, periphyton, and fish taste; although the data indicated that plant production in the grassbeds may have increased as a result of engine operation. This increase in plant production was evident during the growing season when the availability of carbon dioxide limited plant growth in the grassbed community. (Sinha-OEIS)
W77-03900

EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS ON ESTUARINE ORGANISMS - PHASE II,
Maryland Univ., Solomons. Natural Resources Inst.
J. A. Sherk, J. M. O'Connor, D. A. Neumann, R. D. Prince, and K. V. Wood.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A011 372, Price codes: A13 in paper copy, A01 in microfiche. Reference No. 74-20, March 1974. 296 p, 44 fig, 30 tab, 7 ref. DACW72-71-C-0003.

Descriptors: *Maryland, *Water pollution effects, *Estuaries, *Biological communities, *Baseline studies, *Environmental effects, *Bioassays, *Suspended solids, *Estuarine fisheries, *Kaolinite, Analytical techniques, Toxicity, Sediments, Edology.
Identifiers: Lethal effects, Sublethal effects, Fuller's earth, Patuxent River, Delaware Bay.

A three-year laboratory study identified biological components of selected populations of estuarine organisms which were most sensitive to the effects of particle size and concentration of (1) suspended mineral solids similar in size to sediments likely to be found in, or added to, estuarine systems in concentrations typically found during flooding, dredging, and disposal of dredged material, and (2) natural sediments in identical experiments. Generally, bottom-dwelling fish species were most tolerant to suspended solids; filter feeders were most sensitive. Early life stages were more sensitive to suspended solids than adults. Bioassays with natural sediments indicated that suspensions of natural muds affect fishes in the same way as fuller's earth, but higher concentrations of natural material were required to produce the same level of response. Sublethal solids effects on fishes were identified: hematological compensation for reduction in gas exchange across the gill surface, abrasion of the body epithelium, packing of the gut with large quantities of ingested solids, disruption of gill tissue, increased activity, and reduction in stored metabolic reserves. With adequate knowledge of local conditions (life history stages, sediment types, sediment concentrations, seasonal and resident species, duration of exposure, and habitat preference) at estuarine sites selected for environmental modification, our efforts provide baseline data for pre-project decision making based upon concentration effects of different types of suspended sediments. (See also W71-11045) (Sinha-OEIS)
W77-03901

COASTAL MARINE POLLUTION AND FISH,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
M. Waldichuk.
Ocean Management, Vol 2, p 1-60, 1974. 7 tab, 110 ref.

Descriptors: *Waste disposal, *Radionuclides, *Oil pollution, *Toxicity, *Ecosystems, *Biological communities, *Water quality, *Environmental effects, *Water pollution effects, *Pesticides, *Thermal pollution, Coasts, Fish, Shellfish, Domestic wastes, Industrial wastes, Sewage disposal, Pulp wastes, Runoff.
Identifiers: *Outer Continental Shelf, *Coastal zone, Sublethal effects, Mining wastes.

An effort is made to explore the various effects of man, particularly in his disposal of waste into the marine environment, on various fish stocks the world over. Because fish are dependent on lower forms in the food chain for nourishment, and because many of these lower forms constitute a seafood resource for man, they are considered along with the fin-fish as sea life affected by pollutants. Since most pollution originates from continents, the discussion deals mainly with coastal pollution. It is in the coastal zone that the critical problems of the marine environment exist. Moreover, it is estimated that over 90% of the world's fish catch comes from 10% of the world oceans, i.e., the continental shelf and upwelling regions where pollution may be most severe. The remaining 90% of the oceans is a biological desert. Emphasis is placed on fish species along the coast of North America. While there is clear-cut evidence of the harmful effect of pollution on fish stocks in some areas, where some of these fish have been destroyed by acute poisoning or by unfavorable conditions created in the aquatic environment, there are too many cause-effect relationships which must still be speculated upon. (Sinha-OEIS)
W77-03902

EFFECTS OF WASTE WATER ON ESTUARINE ECOSYSTEMS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
D. A. Flemer, and D. R. Heinle.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-241 003, Price codes: A03 in paper copy, A01 in microfiche. Chesapeake Research Consortium, Inc., CRC Publication No. 33 and Maryland University, Natural Resources Institute Ref. No. 74-79 Report to National Science Foundation (RANN), June 1974. 16 p, 15 fig, 1 tab, 11 ref.

Descriptors: *Estuarine environment, *Wastes, *Ecosystems, *Sewage treatment, *Biomass, *Baseline studies, *Environmental effects, Water resources, Algae, Nutrients, Water pollution effects, Chesapeake Bay, Maryland, Continental shelf.
Identifiers: *Patuxent River(Md).

Recent increases in algae, measured as concentration of chlorophyll a, in the Patuxent River estuary appear to have occurred as a consequence of increased loading by sewage in the upper watershed. The increases in concentration of chlorophyll were observed downstream from the turbid sediment-trap portion of the estuary, an impact distant from the points of addition. Primary production, measures by the 14C method, increased also as did zooplankton biomass. Samples of water from the Sandy Point area of the upper Chesapeake Bay were enclosed in 750-liter (200-gallon) polyethylene microcosms, enriched with treated sewage, and ensuing events followed. While the predictions from the microcosms have not been fully validated, clear effects on several parameters were noted. Phosphate appeared to be the major limiting nutrient in these experiments. Enriched microcosms developed higher concentrations of zooplankton and chlorophyll a and rates of primary production, permitting predictions of effects of the sewage treatment plant under various loads. (Sinha-OEIS)
W77-03914

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 1ST QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 592, Price codes: A05 in paper copy, A01 in microfiche. Informal Report No 40 to Naval Facilities Engineering Command, Philadelphia, Penn., November 1974. 85 p, 4 append.

Descriptors: *Dredging, *Spoil banks, *Environmental effects, *Baseline studies, *Biological communities, *Connecticut, Monitoring, Sediments, Benthos, Resources development, Heavy metals, Ocean currents, Ecosystems.
Identifiers: Outer Continental Shelf, *Thames River(Conn), Spoil disposal, Ocean dumping.

The activities and findings of the several integrated research projects designed to monitor the environmental effects of dredging in the Thames River and dredge spoil disposal at the New London Dumping Ground are reported. Studies of the principal contracting agency, the Middle Atlantic Coastal Fisheries Center (MACFC) of the National Marine Fisheries Service (NMFS) from 24 June through 1 November 1974 as well as activities of the subcontractors, the University of Connecticut (UCONN) and the New York Ocean Science Laboratory (NYSOL) are discussed. Surveys to establish baseline values for environmental conditions were completed by all parties prior to the August onset of dredging. UCONN charted predredging temperature, salinity, suspended solids and light transmission characteristics in the Lower Thames. NYOSL conduted three predump surveys of the spoiling area to measure currents and movement of surface and bottom water masses and to determine baseline water column values. MACFC collected and processed dredging and spoiling samples from both river and dump sites. (Sinha-OEIS)
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 2ND QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 595, Price codes: A07 in paper copy, A01 in microfiche. Informal Report No. 49 to Naval Facilities Engineering Command, Philadelphia, Penn., February 1975. 133 p, 5 append.

Descriptors: *Dredging, *Environmental effects, *Heavy metals, *Baseline studies, *Spoil banks, Resources development, *Biological communities, *Connecticut, Monitoring, Sediments, Benthos, Ocean currents, Ecosystems.
Identifiers: Outer Continental Shelf, *Spoil disposal, Ocean dumping, *Thames River(Conn).

The activities and findings of the several integrated research projects designed to monitor the environmental effects of dredging in the Thames River and dredge spoil disposal at the New London Dumping Ground are reported. Progress has been made toward selecting a circulation model for determining dredging-induced variations, and toward characterizing average loads of suspended sediments during autumn. The University of Connecticut report contains photographic documentation of the nature of spoils at the dump site and evidence of past dumping. SCUBA surveys conducted in late November and early December found no outstanding changes in bottom conditions. The New York Ocean Science Laboratory (NYSOL) reports establish predisposal values for the physical and chemical oceanography of the dump site, and describe changes found in September and December as well as effects of single dumping events at those times. The report also presents predisposal concentrations of heavy metals in benthic animals. MACFC's benthic macrofauna studies have shown little change in community characteristics between July and October (outside of the dumping point itself, where October samples consisted of spoil material practically devoid of life). The report includes a tentative schedule of field activities for all investigations through 1975.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 3RD QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 596, Price codes: A07 in paper copy, A01 in microfiche. Informal Report No 62, to Naval Facilities Engineering Command, Philadelphia, Penn., May 1975. 136 p, 6 append.

Descriptors: *Connecticut, *Dredging, *Spoil banks, *Biological communities, *Environmental effects, *Resources development, *Baseline studies, Sediments, Benthos, Ocean currents, Ecosystems.
Identifiers: *Outer Continental Shelf, *Spoil disposal, *Thames River(Conn).

The activities and findings of the several integrated research projects designed to monitor the environmental effects of dredging in the Thames River and dredge spoil disposal at the New London Dumping Ground are reported. Field activities and findings to date are presented, with emphasis on studies conducted between 1 January and 31 March 1975. The University of Connecticut (UCONN) conducted two additional surveys of hydrography in the Thames River, and reported on an intensive survey carried out in November 1974 in the vicinity of the dredging operation. The New York Ocean Science Laboratory (NYSOL) occupied the dump site for physical and chemical measurements on 28 February and 6 March 1975. Current speeds, directions and durations for both dates are presented, along with returns to date from a drifter study. Predredging densities of fecal coliform bacteria are reported, showing highest counts in the river but also elevated numbers at many disposal area stations. The overall study has uncovered no gross effects of the dredging and spoiling outside of the immediate vicinity of these activities. (Sinha-OEIS)
W77-03919

PROCEEDINGS FOR SECOND ANNUAL CONFERENCE ON THE RESTORATION OF COASTAL VEGETATION IN FLORIDA.
Hillsborough Community Coll., Tampa, Fla.
For primary bibliographic entry see Field 5G.
W77-03942

PATTERNS OF SECONDARY SUCCESSION IN A MANGROVE COMMUNITY, TAMPA BAY, FLORIDA,
East Stroudsburg State Coll., Pa. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03947

THE POSSIBLE ROLE OF SPARTINA ALTERNIFLORA LOISEL IN ESTABLISHMENT OF MANGROVES IN FLORIDA,
Hillsborough Community Coll., Tampa, Fla. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03948

EFFORTS IN MARINE REVEGETATION IN ARTIFICIAL HABITATS,
Marco Applied Marine Ecology Station, Marco Island, Fla.
For primary bibliographic entry see Field 5G.
W77-03949

ASPECTS OF RED MANGROVE REFORESTATION IN FLORIDA,
Florida Inst. of Tech., Jensen Beach. Environmental Studies.
For primary bibliographic entry see Field 5G.
W77-03950

SUGGESTED MANGROVE TRANSPLANTING TECHNIQUES,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
For primary bibliographic entry see Field 5G.
W77-03951

PLANTINGS OF RED MANGROVE (RHIZOPHORA MANGLE L.) IN CHARLOTTE AND ST. LUCIE COUNTIES, FLORIDA,
Miami Univ., Coral Gables. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W77-03952

PRODUCTION DYNAMICS OF ALLOPERLA MEDIANA BANKS (PLECOPTERA:CHLOROPERLIDAE) AND DIPLECTRONA MODESTA BANKS (TRICHOPTERA:HYDROPSYCHIDAE) IN WALKER BRANCH, TENNESSEE,
Oak Ridge National Lab. Tenn. Environmental Sciences Div.
R. M. Cushman, J. W. Elwood, and S. G. Hildebrand.
Report No. ORNL-TM-4957 (Environmental Sciences Division Publication No. 785), October 1975. 77 p. 14 fig., 8 tab., 75 ref.W-7504-eng-26.

Descriptors: *Fecundity, *Productivity, *Streams, *Insects, *Stoneflies, *Caddisflies, *Tennessee, Life cycles, Growth rates, Larvae, Population.
Identifiers: Alloperla mediana, Diplectrona modesta, *Walker Branch(Tenn).

Results of a study to estimate production of two caddisfly and stonefly species and to relate their production to stream ecology are presented. Alloperla mediana had a two-year life cycle and an extended hatching period, with a new cohort beginning each December and newly-hatched individuals appearing through the following May. Diplectrona modesta had two overlapping generations, each with a one-year life cycle. Production rates were calculated using the Hynes, removal-summation, instantaneous growth, and 'Allen curve' methods. Estimates of total annual production rates of A. mediana and D. modesta, using the four methods, ranged from 97.9 to 152.9 mg sq m/yr and from 564.6 to 1150.8 mg sq m/yr, respectively. The lowest estimate for each species was obtained with the 'Allen curve' method and the highest estimate was obtained with the removal-summation method. Most of the production of D. modesta was from the summer generation (summer adult flight), with a lesser amount contributed by the spring generation (spring adult flight). Error sources in the production estimates are discussed. Maximum growth and larvae production of these insects were related to seasonal inputs of terrestrial leaves. Possible ecological adaptations by the life histories of the two species are mentioned. (Auen-Wisconsin)
W77-03953

A REPORT ON THE METHYLMERCURY SITUATION IN PAR POND,
Georgia Univ., Athens. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W77-03954

TECHNICAL AND MICROECONOMIC ANALYSIS OF CADMIUM AND ITS COMPOUNDS,
Versar, Inc., Springfield, Va.
For primary bibliographic entry see Field 5B.
W77-03963

PRIMARY PRODUCTIVITY AND MINERAL CYCLING IN AQUATIC MACROPHYTE COMMUNITIES OF THE CHOWAN RIVER, NORTH CAROLINA,
East Carolina Univ., Greenville. Dept. of Biology.
M. M. Brinson, and G. J. Davis.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 092, Price codes: A08 in paper copy, A01 in microfiche. Water Resources Research Institute of the University of North Carolina, Raleigh, UNC-WRRI Report No 120, September 1976. 137 p, 23 fig, 26 tab, 138 ref. OWRT B-079-NC(4), 14-31-0001-5098.

Descriptors: *Rooted aquatic plants, Aquatic plants, *Aquatic weeds, *Plant growth, Aquatic productivity, *Cycling nutrients, Chemical analysis, Nutrient removal, *North Carolina, Rivers, *Primary productivity, Water quality.
Identifiers: *Chowan River(NC), *Aquatic macrophytes, *Yellow water lily, *Mineral cycling, *Water willow.

The aquatic macrophyte communities of the lower Chowan River are dominated by the yellow water lily (Nuphar luteum) and the water willow (Justicia americana). Aerial surveys (370 m altitude) made in 1974-75 by means of overlapping photography of the shoreline revealed about 27 hectares of aquatic macrophyte stands in a 52 km sector of the river north of Albemarle Sound. An estimated 99 percent of the coverage was by Nuphar. Peak biomass of Nuphar ranged between 115 and 300 grams dry weight per square meter at three sites and net primary productivity was estimated at 222 grams dry weight per square meter per year based on turnover rate of leaves and growth increments of rhizomes and roots. About 77 percent of the Nuphar biomass was in the sediments (roots and rhizomes) while 92 percent of the annual net primary productivity occurred in above-ground structures (leaves, petioles, and reproductive parts). A radioisotope technique was employed to trace bidirectional movement of phosphorus in Nuphar. Upward translocation followed root absorption and downward translocation followed submersed leaf absorption of phosphorus. Aquatic macrophytes are unlikely to affect the water quality and other uses of the lower Chowan River if current conditions prevail. Because of the restricted area of the shallow littoral, it is doubtful that aquatic macrophytes will have a significant impact on the productivity or nutrient status of the river system in the future. (Stewart-North Carolina State)
W77-03969

CURRENT PROBLEMS OF HYGIENIC STANDARDIZATION OF NEW CHEMICAL SUBSTANCES, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
G. I. Rumyantsev, and S. M. Novikov.
Gig Sanit 8, p 76-79, 1975.

Descriptors: Public health, Industrial wastes, *Chemical wastes, Metabolism, *Toxicity, *Water quality standards, Water pollution effects, Water pollution sources.

At the current stage of development of hygienic science much attention is being devoted to an evaluation of the hazard of chemical substances in the case of their simultaneous intake into the human organism with air, water and food products. In industrial toxicology it is important to develop principles of hygienic standardization under conditions of the combined effect of chemical substances and the combined effect of physical and chemical factors of the industrial environment, with consideration of the characteristics of the body's reaction to the combined intake of poisons via the respiratory organs and skin. The solution of these problems will depend in many respects on a study of the absorption, distribution, metabolism and excretion of foreign substances entering the body by various routes, character of the toxic effect and dynamics of the pathological process in comparison with the chemical structure and content of industrial poisons in the body, etc.--Copyright 1976, Biological Abstracts, Inc.
W77-04015

IRON TRANSPORT IN A LAKE TAHOE TRIBUTARY AND ITS POTENTIAL INFLUENCE UPON PHYTOPLANKTON GROWTH,
California Univ., Richmond. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 5B.
W77-04022

CONCENTRATION OF POLYVALENT METALS BY SEAWEEDS IN VOSTOK BAY, SEA OF JAPAN,
Akademiya Nauk SSSR, Vladivostok.
G. H. Saenko, and M. D. Koryakova.
Marine Biology, Vol. 34, 1976, p. 169-176, 3 tab., 36 ref.

Descriptors: Metals, Sea water, Marne algae, Marine plants, Titanium, Vanadium, Manganese, Iron, Nicke. Copper, Zinc, Molybdenum, Chromium, Cobalt, Path of pollutants.
Identifiers: Ptilota filicina, Fhodomela larix, Acquarum cribrosum, Ulvaria splendens, Ulva fenestrata, Enteromorpha prolifera, Codium yessoenis, Zostera asiatica, Phyllospadix awatenis, Sea of Japan, Vostok Bay.

Spectrophotometric methods were used to measure the contents of the polyvalent metals Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Mo and Zn in 16 species of red, brown and green seaweeds and 2 species of higher water plants collected from the intertidol and sublittoral zones of Vostok Bay, Sea of Japan, Some of the species displayed a unique capability for increased accumulation of groups of several metals. We have termed this ability specific group concentration. Thus, Ptilota filicina concentrates Ti, V, Mn, Fe, Ni, Cu, Zn, and Mo; Polysiphonia japonica Ti, V, Mn, Fe, Zn, Mo, and Cr; Rhodomela larix Ti, V, Mn, Fe, Ni, Zn, and Cr; Agarum cribrosum Ti, V, Mn, Fe, Ni, Zn, and Cr; Ulvaria splendens Ti, V, Mn, Fe, Ni, and Cu; Ulva fenestrata Mn, Fe, Ni, and Cu; Enteromorpha prolifera Mn, Co, Zn, Mo, and Cr; Codium yessoenis V, Mn, Fe, Zn, and Cr; Zostera asiatica Ti, Mn, Ni, and Mo; Phyllospadix iwatensis Ti, V, Mn, Fe, and Zn. (Katz)
W77-04023

AQUATIC ORGANISMS RESPONSE TO SEVERE STRESS FOLLOWING ACUTELY SUBLETHAL TOXICANT EXPOSURE,
Virginian Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
J. Cairns, Jr., W. F. Calhoun, M. J. McGinniss, and W. Straka.

Descriptors: Bioassay, Mortalities, Fish, *Snails, Laboratory tests, Laboratory animals, *Brown trout, *Thermal stress, *Thermal pollution, Zinc, Benthic fauna, Stress, *Lethal limit, Phenols, Lampreys.
Identifiers: Goniobasis livescens, p-nitrophenol, Lampricides, 3-trifluoromethyl-r-nitrophenol, TFM, Thermal shock.

Snails, Goniobasis livescens (Menke) were exposed to acutely sublethal concentrations of p-nitrophenol and the lampricide, 3-trifluoromethyl-4-mitrophenol (TFM), and then to acutely lethal thermal shocks. The same species were also exposed to acutely sublethal concentrations of zinc followed by exposure to acutely lethal concentrations of p-nitrophenol; and to acutely sublethal concentrations of TFM followed by exposure to acutely lethal concetrations of zinc. Brown trout, Salmo trutta, were exposed to acutely sublethal concentrations of TFM and then to an acutely lethal thermal shock. Results of these experiments indicate that prior exposure to acutely sublethal toxicant concentrations may reduce survival time for a subsequent exposure to acutely lethal concentrations of a second toxicant (e.g., snails exposed to Zn++then p-nitrophenol) but neither prior or concomitant exposure to acutely sublethal toxicant concentrations insures that the median survival time for a lethal exposure will be significantly altered (e.g. snails to 0.2 x 48 hr LC50 for TFM then Zn++). However, some acutely sublethal concentrations of a toxicant may significantly alter survival time of snails to a lethal concentration of a different toxicant (e.g. exposure to 0.4 x 48 hour LC50 TFM then a lethal doze of Zn++). The brown trout exposed to an acutely sublethal concentration of TFM and then an acutely lethal thermal shock did have significantly altered survival patterns. (Katz)
W77-04024

UPTAKE AND RETENTION OF KUWAIT CRUDE OIL AND ITS EFFECTS ON OXYGEN UPTAKE BY THE SOFT-SHELL CLAM, MYA ARENARIA,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
W. C. Fong.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976), p. 2774-2780, 2 tab., 3 fig., 26 ref.

Descriptors: Oil, *Oil pollution, Oily water, Water pollution effects, *Clams, Benthos, Marine animals, Molluscs, Bioassay, Physiological ecology, Path of pollutants, Pathology, Oxygen, Oxygen requirements, Biochemistry, Lipids, *Absorption, Respiration.
Identifiers: *Soft shell clam, Gills, *Kuwait Crude oil, Tissue lipids, Tissue concentration.

Mya arenaria gills are capable of removing finely dispersed oil globules of 1-30 micro/m diam from sea water along with food particles. Clams exposed to seawater concentrations of 90-380 micro/g oil/liter for 10 days at 18C accumulated oil in their tissues. Concentrations incorporated are directly related to the lipid content of tissues. Approximately 6 mg oil/g lipid was observed within the tissue of individual clams. Respiration rates of small clams (shell length 3.75-4.50 cm) at 18C are significantly increased after 3 wk of exposure to sea water containing 220-370 micro/g oil/liter. (Katz)
W77-04026

ACUTE TOXICITY OF RESIDUAL CHLORINE IN WASTEWATER TO COHO SALMON (ONCORHYNCHUS KISUTCH) AND SOME RESULTANT HEMATOLOGIC CHANGES,
Municipality of Metropolitan Seattle, Wash. Water Quality Lab.
J. A. Buckley.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976), p. 2854-2856, 1 tab., 15 ref.

Descriptors: Bioassay, *Toxicity, *Salmon, Laboratory animals, Water pollution effects, Water pollution effects, *Chlorine, Sewage treatment, Pathology, Biochemistry, Fish fry, Seawater, Mortalities.
Identifiers: *Coho salmon, Hematology, Acute toxicity, Continuous flow bioassays, Residual chlorine, Hemoglobin.

Juvenile coho salmon (Oncorhynchus kisutch) were exposed to treated wastewater containing lethal levels of total residual chlorine (TRC) with seawater diluent under continuous flow conditions. The 96-h TL50 was 0.07 mg/liter TRCl2 (4% effluent). Exposure resulted in a slight reduction (significant P=.05) in hemoglobin, a slight (significant P=.05) in methemoglobin, and a temporary decrease (not significant P=.05) in percentage of circulating immature erythrocytes. (Katz)
W77-04027

THE KINETICS OF ACCUMULATION AND EXCRETION OF FERRIC HYDROXIDE IN MYTILUS EDULIS (L.) AND ITS DISTRIBUTION IN THE TISSUES,
Institute of Marine Biochemistry, Aberdeen (Scotland).
S. G. George, B. J. S. Pirie, and T. L. Coombs.
Journal of Experimental Marine Biology and Ecology, Vol. 23, 1976, p. 71-84, 2 tab., 9 fig., 12 ref.

Descriptors: *Mollusks, *Mussels, Commercial shellfish, Iron, Metals, Water pollution effects, *Path of pollutants, Animal physiology, Marine pollution, Heavy metals, Water quality, *Kinetics, Distribution.

Identifiers: Particulate ferric hydroxide, Iron accumulation, Iron excretion, Tissues, Viscera, Kidneys, Gills, Muscle, Mantle.

Iron, which occurs in sea water as particulate ferric hydroxide, is accumulated to high concentrations by the common mussel, Mytilus edulis (L.). The kinetics of the accumulation and excretion of iron in Mytilus has been studied using 59Fe-labelled ferric hydroxide and the tissue distribution and identification at the sub-cellular level determined by analytical electron microscopy. Iron-59 accumulates in linear proportion to the sea-water concentration and is found in all tissues; the concentration factors for viscera, kidneys, gills, muscle = mantle is 25:6:4:1, respectively. The particulate iron is taken up by pinocytosis by special epithelial cells in the gills, gut, kidney and possibly labial palps and held in membrane-bound vesicles, unaccompanied by muscus in the case of gills and kidney, but with mucus present in the digestive diverticulum and mid-gut cells. There is no free iron within the cytoplasm. Approximately 30% of the iron presented to the gut is not absorbed being voided with the faeces. The absorbed iron is exocytosed and then passed on to amoebocytes in the haemolymph for transport to other tissues, a maor portion being excreted by transfer to the byssal threads. (Katz)
W77-04028

COLONIAL AUKS AND EIDERS AS POTENTIAL INDICATORS OF OIL POLLUTION,
Canadian Wildlife Service, Delta (British Columbia).
For primary bibliographic entry see Field 5A.
W77-04029

THE EFFECT OF DISSOLVED PETROLEUM PRODUCTS ON SOME OF THE ASPECTS OF CARBOHYDRATE METABOLISM IN FISHES AND INVERTEBRATES,
All-Union Research Inst. of Marine Fisheries and Oceanography, Moscow (USSR).
N. D. Masmanidi, and G. I. Kovaleva.
Journal of Ichthyology, Vol. 15(5), 1975, p. 811-816, 3 fig., 9 ref. (translation of original Russian abstract).

Descriptors: Oil, *Oil pollution, Water pollution, Path of pollutants, Animal physiology, Pathology, Biochemistry, *Toxicity, Mortality, Marine fish, Shrimp, Commercial fish, Bioassay, *Metabolism.
Identifiers: *Petroleum toxicity, *Carbohydrate metabolism, Toxicity mechaism, Porty, Sile.

Consideration is given in the article to the symptoms of petroleum toxicosis in mobile aquatic organisms (fishes, their larvae and shrimps), as well as to the alteration of some of the indicators of carbohydrate metabolism in fishes, muscles and shrimps under conditions of acute, subacute and chronic toxicity by dissolved petroleum products. It is concluded from the similarity of the reaction of organisms at different phylogenetic levels to the effect of a petroleum toxicity that there may possibly be a single mechanism in the action of dissolved petroleum products on living structures. (Katz)
W77-04030

LONG-TERM EFFECTS OF METHYLMERCURIC CHLORIDE ON THREE GENERATIONS OF BROOK TROUT: TOXICITY ACCUMULATION, DISTRIBUTION AND ELIMINATION,
Environmental Research Lab., Duluth, Minn.
J. M. McKim, G. F. Olson, G. W. Holcombe, and E. P. Hunt.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976), p. 2726-2739, 4 tab., 5 fig., 38 ref.

Descriptors: *Mercury, Water pollution effects, Path of pollutants, Metals, *Brook trout, Freshwater fish, *Toxicity, Animal physiology, Mortality, Bioassay, Environmental effects, Laboratory experiments, Growth rates, Reproduction, Heavy metals, *Distribution.
Identifiers: *Methylmercuric chloride, Accumulation, Elimination, First generation fish, Second generation fish, Monomethyl mercury, Muscle residues.

During the 144-wk period three generations of brook trout (Salvelinus fontinalis) were continuously exposed to mean water concentrations of methylmercuric chloride (MMC) of 2.93, 0.93, 0.29, 0.09, 0.03, and 0.010 (control) microgram Hg/liter. During the first 39 wk the highest concentration (2.93 microgram Hg/liter) produced deformities and 88% mortality of first generation adults. At an MMC concentration of 0.93 microgram/liter, second-generation trout developed deformities and all but one female died during the 108-wk exposure. No significant effects on survival, growth, or reproduction of second-generation trout were noted at any of the lower MMC concentrations. No toxic symptoms were observed in the third generation at the three lowest MMC concentrations. The maximum acceptable toxicant concentration (MATC) for brook trout exposed to MMC in this water with a hardness of 45 mg/liter (as CaCO3) and a pH of 7.5 fell between 0.93 and 0.29 microgram Hg/liter. The mean 96-h LC50 for yearling (200 g) and 20-wk-old (12 g) juvenile brook trout exposed to MMC was 75.0 microgram Hg/liter, and the application factor (MATC/96-h LC50) lies between 0.004 and 0.013. The accumulation rate of mercury by eight selected tissues of first-generation trout exposed to MMC was relatively rapid at all MMC concentrations tested. The 2-wk tissue Hg water Hg concentration factors ranged from 1 x 101 to 12 x 103, depending on the tissue, whereas after 28-38 wk of exposure the maximum tissue Hg:water Hg concentration factors for both first- and second-generation trout ranged from 6.9 x 103 to 6.3 x 104. The blood, spleen, and kidney accumulated mercury most rapidly and contained the highest residues in both first- and second-generation trout followed by liver, gill, brain, gonad, and muscle in order of decreasing mercury residues. There was no significant elimination of mercury from the tissue of first- or second-generation fish, yet a 'steady state' (micrograms mercury per gram = constant) was reached in all tissues after 20-28 wk of continuous water exposure. Monomethylmercury made up 90-95% of the total mercury present in muscle, the only tissue analyzed for this compound. Mean muscle residues in first-generation trout, dying after 16-28 wk of exposure to 2.93 microgram Hg/liter and in second-generation trout, dying after 64-100 wk of exposure to 0.93 microgram Hg/liter, were 23.5 and 9.5 microgram Hg/liter, respectively. (Katz)
W77-04031

EXPERIMENTAL AND FIELD STUDIES IN HYGIENIC ASSESSMENT OF DRINKING WATER CONTAINING BORON, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W77-04033

EFFECTS OF DIETARY AROCLOR (R) ON CHANNEL CATFISH (ICTALURUS PUNCTATUS) AND THE SELECTIVE ACCUMULATION OF PCB COMPONENTS,
Illinois Univ. at Urbana-Champaign. Dept. of Veterinary Physiology and Pharmacology.
L. G. Hansen, W. B. Wiekhorst, and J. Simon.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 1343-1352, 1976, 8 tab., 3 fig., 25 ref.

Descriptors: *Bioassay, *Channel catfish, *Aroclors, *Polychlorinated biphenyls, *Pesticide residues, *Absorption, *Water pollution effects, *Growth rates, *Fish physiology, Chlorinated hydrocarbon pesticides, Organic pesticides, Laboratory tests, Environmental effects, Pesticides.
Identifiers: Tetrachlorobiphenyl.

Channel catfish (Ictalurus punctatus) fingerlings fed a diet containing 20 ppm Aroclor(R) 1242 for 20 wk responded with a reduced weight gain and liver hypertrophy when compared to controls. When treated fish were fed the control diet for 8 subsequent wk followed by 8 additional wk of Aroclor feed, they approached control values for liver weight and surpassed the rate of gain for control fish. No histopathological lesions were observed in the fish fed PCB. The total PCB in fish declined slightly during an 8-wk PCB-free period beginning at week 12, but the PCB burden remained constant when the PCB-free period was begun at week 20. During PCB-free periods, there was a shift in residues from the edible carcass to the offal. Residues are discussed as components as well as total PCB. We found that a tetrachlorobiphenyl is more persistent than some higher chlorinated components and that various tissues accumulated different profiles of components. (Katz)
W77-04034

NITROGEN AND PHOSPHOROUS REMOVAL FROM LAKES BY FISH HARVEST,
British Columbia Dept. of Recreation and Conservation, Penticton. Fish and Wildlife Branch.
For primary bibliographic entry see Field 5G.
W77-04035

ARSENIC CONCENTRATIONS IN SOME COEXISTING MARINE ORGANISMS FROM NEWFOUNDLAND AND LABRADOR,
Fisheries and Marine Service, St. John's (Newfoundland). Biological Station.
V. S. Kennedy.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 1388-1393, 1976, 1 fig., 2 tab., 18 ref.

Descriptors: *Shrimp, *Zooplankton, *Arsenic compounds, Size, Crustaceans, Invertebrates, Fish, *Food chains, Copepods, Metals, Path of pollutants, Mud, Environment.
Identifiers: *Euphausiids, *Pandalus sp., *Atlantic cod.

Inorganic arsenic concentrations in sea water and mud, and total arsenic concentrations in bodies of shrimp, zooplankton, and fish from northern Newfoundland and southern Labrador were measured. There was a positive relationship between concentration and carapace length in Pandalus borealis and P. montagui and a negative relationship in Eualus macilentus. There was no relationship between concentrations in shrimp eggs and carapace length. Arsenic concentrations in zooplankton and fish muscle were relatively low compared with the shrimp species; amphipods contained more arsenic than copepods or euphausiids, and American plaice (Hippoglossoides platessoides) more than redfish (Sebastes marinus), turbot (Reinhardtius hippoglossoides) and Atlantic cod (Gadus morhua). There was no evidence of increasing arsenic concentrations through successively higher levels of the food chain. (Katz)
W77-04036

TEMPERATURE EFFECTS ON LACTATE-GLYCOGEN METABOLISM IN ZINC-INTOXICATED RAINBOW TROUT (SALMO GAIRDNERI),
Guelph Univ. (Ontario). Dept. of Zoology.
P. V. Hodson.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 1393-1397, 1976. 1 tab., 2 fig., 21 ref.

Descriptors: *Fish physiology, *Lethal limit, *Water pollution effects, *Mode of action,

*Rainbow trout, *Bioassay, *Toxicity, *Zinc, *Metabolism, *Temperature, *Biochemistry, Salmonids, Trout, Laboratory tests, Metals, Environmental effects.
Identifiers: *Gills, *Lactic acid, *Glycogen.

Acute, lethal exposures of fish to zinc cause gill damage and subsequent death through tissue hypoxia. This experiment showed that lactic acid production and glycogen utilization in dorsal white muscle of rainbow trout (Salmo gairdneri) increased with time of exposure to a lethal concentration of zinc. Exposure of trout to zinc at 3, 11, and 19 C did not affect the timing or percentage change of lactic acid production or utilization of glycogen. Therefore, the previously observed high tolerance of zinc by warm-acclimated fish is not due to increased resistance to the tissue hypoxia caused by gill damage. (Katz)
W77-04037

FIN EROSION DISEASE OF STARRY FLOUNDER (PLATICHTHYS STELLATUS) AND ENGLISH SOLE (PAROPHRYS VETULUS) IN THE ESTUARY OF THE DUWAMISH RIVER, SEATTLE, WASHINGTON,
California Univ., Davis. Dept. of Pathology.
S. R. Wellings, C. E. Alpens, B. B. McCain, and B. S. Miller.
Journal of the Fisheries Research Board of Canada, Vol. 33, 1976, p. 2577-2586, 1 tab., 14 fig., 20 ref.

Descriptors: *Marine fish, Pathology, Biochemistry, Water pollution effects, Physiological ecology, Zoonoses, Industrial wastes, Estuaries, Estuarine environment, Diseases, Bottom fish, Demersal fish, *Fish diseases, *Washington.
Identifiers: *Fin erosion disease, *Starry flounder, English sole, Platichthys stellatus, Parophrys vetulus, Duwamish River(Wash), Puget Sound(Wash), Fish pathology, Genetic constitution.

Fin erosion in the starry flounder (Platichthys stellatus) and English sole (Parophrys vetulus) of the Duwamish River, Washington, is characterized by ulcerating chronic inflammation and fibrosis with resorption of fin rays. The end result is deformation, shortening, and retraction of residual fin tissue with loss of functional surface. We suggest that the incidence of fin erosion in a particular population is related to an interaction between genetic constitution and multiple environmental variables, including a variety of chemical pollutants. (Katz)
W77-04038

MINERAL METABOLISM DURING THE ONTOGENESIS OF RAINBOW TROUT (SALMO GAIRDNERI),
Michigan State Univ., East Lansing. Dept. of Animal Husbandry.
I. N. Zeitoun, D. E. Ullrey, W. G. Berger, and W. T. Magee.
Journal of the Fisheries Research Board of Canada, Vol. 33, (1976), p 2587-2591, 2 tab., 1 fig., 12 ref.

Descriptors: *Rainbow trout, Fish eggs, Laboratory animals, Sodium, Iron, Zinc, Calcium, Potassium, Phosphorous, Copper, Physiological ecology, Fish physiology, Water quality, Laboratory tests, *Metabolism, Mineralogy.
Identifiers: *Ontogenesis, *metal Requirements.

Rainbow trout (Salmo gairdneri) eggs were collected from three females, fertilized by the milt of to males per female, and incubated separately. Samples were taken before fertilization at +0.5 h and on days 1, 1.5, 3.4, 5, 13, 17, 21 at hatching (23 days), and on day 37, immediately after postyolk absorption. The water environment contributed an estimated minimum 26% of the Na., 30% of the Fe, and 13% of the Zn found at hatching. Derivation of Ca, Na, K, Fe, and Zn from the water environment at postyolk absorption was estimated to be at least 70, 76, 45, 68, and 2%, respectively. All the P and Cu at hatching and in the larva could have been derived from the unfertilized oocyte. (Katz)
W77-04039

RELATIONSHIPS OF EPIBIOTIC FOULING AND MORTALITIES OF EGGS OF THE DUNGENESS CRAB (CANCER MAGISTER),
California Univ., Bodega Bay. Bodega Marine Lab.
W. S. Fisher.
Journal of the Fisheries Research Board of Canada, Vol. 33, 1976, p. 2489-2853, 5 fig., 5 ref.

Descriptors: *Crabs, Marine bacteria, Marine fungi, Marine microorganisms, Crustaceans, *Mortalities, Crustaceans, Zoonoses, *California, Commercial shellfish, Antibiotics, Seawater, Water pollution effects.
Identifiers: *Dungeness crab(Cancer magister), Epibiotic fouling, Egg mortalities, Chemotherapeutic treatment.

This study describes the close association of epibiotic microbial fouling on the eggs of Cancer magister and eggs mortalities. Laboratory experiments showed that nutrient enriched sea water increased the number of measurable filaments on the egg surface and increased the number of egg mortalities. Chemotherapeutic treatment of the sea water decreased the number of filaments and mortalities. The use of antibiotics decreased the number of mortalities while the number of filaments steadily increased, suggesting that antibiotic-sensitive, nonfilamentous forms may be substantially responsible for mortalities caused by microbial fouling. Darkness and ultraviolet irradiation of the sea water had no significant effects on filaments or egg mortalities. Both filamentous fouling and egg mortalities described exponential declines with increased depth into the egg masses.(Katz).
W77-04040

WEED CONTROL AND THE ENVIRONMENT, (IN FRENCH),
Organisation Europeenne et Medterraneenne pour la Protection des Plantes.
For primary bibliographic entry see Field 5B.
W77-04041

LONG-TERM CHEMICAL EFFECTS OF PETROLEUM IN SOUTH LOUISIANA WETLANDS - 1. ORGANIC CARBON IN SEDIMENTS AND WATERS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
T. Whelan, J. Ishmael, and W. S. Bishop.
Marine Pollution Bulletin, Vol. 7, No. 8, August, 1976, p. 150-155, 3 tab., 3 fig., 19 ref.

Descriptors: Oil, *Oil pollution, Oily waters, *Water pollution effects, *Louisiana, *Wetlands, Marshes, Organic compounds, Organic wastes, Salt marshes, Sediments.
Identifiers: Southern Louisiana wetlands, Organic carbon, Chronic petroleum input, Shallow water marsh, Active oil field, Total organic carbon, Core waters, C17, Oil field sediments, Dissolved organic carbon.

The chemical effects of chronic petroleum input into a shallow water marsh were examined by measuring hydrocarbon levels and dissolved organic carbon content of sediments associated with two active oil fields in south Louisiana. Annual levels of total organic carbon in the surface waters of the oil fields were higher by 1 mg C/l in the salt marsh and 5 mg C/l in the fresh marsh than the respective control sites. Average dissolved organic carbon concentrations in the interstitial waters of cores taken within the oil field environments were 105% higher than the control in the salt marsh and 43% higher than the control in the fresh marsh. Significantly lower ratios of C17 to pristane occurred in both oil field sediments; however, average odd-even predominance values were not indicative of petroleum contaminated sediments. The results indicate that microbial processes are responsible for dissolution of petroleum into dissolved organic carbon and that dissolved organic carbon concentrations may be a more significant measure of chronic petroleum input than hydrocarbon distribution. (Katz)
W77-04043

ACCLIMATION AND TOLERANCE OF ARTEMIA SALINA TO COPPER SALTS,
Royal Univ. of Malta, Valletta. Dept. of Biology.
L. J. Saliba, and R. M. Krzys.
Marine Biology, Vol. 38 (1976), p. 231-238, 3 fig., 6 ref.

Descriptors: Bioassay, Mortality, Toxicity, Copper, Crustaceans, Zooplankton, Sea water, Laboratory studies, *Copper compounds, Copper sulfate, Growth stages, Larvae, *Brine shrimp, *Salts, *Salt tolerance.
Identifiers: Cupric chloride, Cupric acetate, Cupric carbonate, Acclimation.

The brine shrimp Artemia salina L. was acclimated in sea water with cupric chloride, acetate, carbonate, and sulphate, each at concentrations of 0.1, 0.05, and 0.025 ppm Cu++, together with sea water controls. Growth inhibition was observed in all four compounds, generally in direct relationship to the concentration. It was least in sulphate, and increased progressively in chloride, acetate and carbonate in that order. No inhibition, however, was observed in carbonate at 0.025 ppm Cu++. In toxicity tests, 2-week old larvae from each solution were exposed to concentrations of 10, 7.5, 5, 2.5 and 1 ppm Cu++ of the same compounds, together with unacclimated larvae of the same age. Similar tests were held with 6-week old adults acclimated (a) in 0.1 ppm Cu++ (chloride, acetate and sulphate) using the same concentrations and (b) in 0.5 ppm Cu++ (carbonate), using 150, 125, 100, 75, and 50 ppm Cu++. Toxicity to unacclimated larvae and adults differed with the compounds, carbonate being the least toxic, followed by sulphate, chloride, and acetate in increasing order. Larvae acclimated in chloride (0.025 ppm Cu++) and sulphate (0.1 and 0.5 ppm Cu++) showed an increased tolerance to 1 and 2.5 ppm Cu++ compared to untreated controls. Tolerance was not enhanced from 5 ppm Cu++ upwards. In both compounds, adults acclimated in 0.1 ppm Cu++ showed an increased tolerance to concentrations between 1 and 7.5 ppm Cu++ compared to controls. Larval mortality in carbonate was below 50% in all test solutions. Adults acclimated at 0.5 ppm Cu++ showed an increased tolerance to 50 ppm Cu++ compared to controls. (Katz)
W77-04044

ACCUMULATION AND RELEASE OF PETROLEUM-DERIVED AROMATIC HYDROCARBONS BY FOUR SPECIES OF MARINE ANIMALS,
Texas A and M Univ. College Station. Dept. of Biology.
J. M. Neff, B. A. Cox, D. Dixit, and J. W. Anderson.
Marine Biology, Vol. 38, 1976, p. 279-289, 5 tab., 3 fig., 38 ref.

Descriptors: *Oil pollution, Oily waters, Oil spills, Water pollution, Water pollution sources, *Mollusks, *Oysters, *Clams, *Shrimp, Fish, Metabolism, Biochemistry, Lipids, Water pollution effects.
Identifiers: *Aromatic hydrocarbons, Petroleum hydrocarbons, Alkanes, Tissue lipids, Bioaccumulation, Accumulated hydrocarbons, Detoxification.

When exposed to oil-contaminated seawater, marine animals accumulate a wide variety of petroleum hydrocarbons in their tissues. Generally, the aromatic hydrocarbons are accumulated to a greater extent and are retained longer than the alkanes. In all species tested, accumulation of aromatic hydrocarbons appears to be dependent primarily on a partitioning of the hydrocarbons between the exposure water and the tissue lipids. Current evidence indicates that binding of hydrocarbons to tissue lipids is by hydrophobic interactions and not by covalent bonding. Bioaccumulation factors (tissue:water concentration ratio) increase in proportion to the increase in molecular weight of the aromatic hydrocarbons. When returned to oil-free seawater, marine animals rapidly release the accumulated hydrocarbons from their tissues. Release rates are species-dependent. Shrimp and fish, which can metabolize aromatic hydrocarbons, release them more rapidly than clams and oysters, which apparently lack the detoxifying enzymes. Release of hydrocarbons to background or undetectable levels requires from 2 to 60 days. The high molecular weight aromatic hydrocarbons are released more slowly than the low molecular weight hydrocarbons. (Katz)
W77-04045

DISTRIBUTION AND ABUNDANCE OF HEAVY METALS IN FINFISH, INVERTEBRATES AND SEDIMENTS COLLECTED AT A DEEP WATER DISPOSAL SITE,
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Lab.; and National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5B.
W77-04046

EFFECT OF HEAVY METALS ON HATCHING OF BRINE SHRIMP EGGS,
Royal Univ. of Malta, Valletta. Dept. of Biology.
L. J. Saliba, and R. M. Krzyz.
Marine Pollution Bulletin, Vol. 7(10), Oct., 1976, p. 181-182, 1 tab., 1 fig., 12 ref.

Descriptors: *Copper, Copper sulfate, Zinc, *Heavy metals, *Toxicity, Bioassay, Mortalities, Crustaceans, Marine animals, Water pollution effects, Sea water, Lead, Iron, Laboratory tests, *Brine shrimp, *Lethal limit.
Identifiers: *Brine shrimp eggs, Egg hatching.

The effects of heavy metals on marine organisms are currently being studied not only in terms of acute toxicity, but also insofar as they affect natural life-processes at sub-lethal levels, as such levels are more commonly encountered in polluted waters. Growth retardation and interference with reproductive success have been among the most common aspects. (Katz)
W77-04047

THE EFFECT OF CHINA CLAY ON THE FISH OF ST. AUSTELL AND MEVAGISSEY BAYS,
Ministry of Agriculture, Fisheries and Food, Burnham-on-Crouch (England). Fisheries Lab.
K. W. Wilson, and P. M. Connor.
Journal of the Marine Biological Association of the United Kingdom, Vol. 56(3), 1976, p. 769-780, 2 tab., 4 fig., 5 ref.

Descriptors: Commercial fish, *Marine fish, Commercial fishing, Benthic fauna, *Sediment discharge, Sediments, Mineral industry, Mine wastes, On-site surveys, Pathology, Behavior.
Identifiers: *China clay, Avoidance, Gut contents, Flatfish, *English Channel, Mackerel, *St. Anstell Bay(U.K.), *Nevagissey Bay(U.K.).

A trawl survey compared the numbers and distribution of fish on grounds affected by china clay with adjacent unaffected areas. No major differences in commercial catches between the two areas were found but china clay areas appeared to be important nursery grounds for dabs. Solenettes were only found in those areas. Mackerel and garfish were caught in water coloured with suspended china clay but on one occasion whitebait were observed to avoid the affected water. The gut contents of flatfish reflected the differences in the benthos available to them in these areas. (Katz)
W77-04049

DELETERIOUS EFFECTS OF COREXIT 9527 ON FERTILIZATION AND DEVELOPMENT,
Tromsoe Univ. (Norway). Inst. of Biology and Geology.
S. Lonning, and B. E. Hagstrom.
Marine Pollution Bulletin, Vol. 7(7), 1976, p 124-127, 3 tab., 2 fig., 9 ref.

Descriptors: *Toxicity, Bioassay, Mortalities, *Oil pollution, Oil, Water pollution effects, *Marine fish, Invertebrates, Marine benthos, Marine fauna, Reproduction, Pathology, Dispersion, Waste disposal, *Fertilization, *Larval growth stage.

The effect of the water soluble oil dispersant Corexit 9527 was tested on larvae from several species of sea urchins and marine fishes. Severe effects in fertilization and development were registered often resulting in pathological larvae and rapid cytolysis. The combination of Corexit 9527 with oil was found to be even more dangerous to the embryo than Corexit or oil alone. (Katz)
W77-04050

THE DISTRIBUTION OF SHORT-CHAIN HALOGENATED ALIPHATIC HYDROCARBONS IN SOME MARINE ORGANISMS,
Liverpool Univ. (England). Dept. of Oceanography.
A. G. Dickson, and J. P. Riley.
Marine Pollution Bulletin, Vol. 7(9), 1976, p. 167-169, 2 tab., 4 ref.

Descriptors: *Marine animals, Mollusks, Marinfish, Sharks, Mussels, *Chlorinated hydrocarbon pesticides, Chlorides, Animal physiology, Biochemistry, Lodides, Atlantic Ocean, Fluorides, Distribution.
Identifiers: *Halogenated aliphatic hydrocarbons, CFCl3, Methyl lodide, Methyl trichloride, Carbon tetrachloride, Halogenated short chain hydrocarbons, Aerosol propellants, Degreasing fluids, Dry cleaning fluids, Tissue concentrations.

A number of halogenated aliphatic hydrocarbons have been determined in the various organs of three species of molluscs and five species of fish. In general, the compounds were only slightly enriched (2-25 times) on a dry weight basis relative to their seawater concentrations. The usual order of enrichment was found to be brain >gill>liver>muscle. Methyl iodide was found to be the compound most strongly concentrated. (Katz)
W77-04051

EFFECTS OF CRUDE OIL INGREDIENTS ON THE DEVELOPMENT AND OXYGEN UPTAKE OF HARD CLAM, MERETRIX LUSORIA (RODING), (IN KOREAN),
Pusan National Univ. (Republic of Korea). Inst. of Marine Sciences.
B. D. Lee, T. Y. Lee, and P. Chin.
Publication of the Institute of Marine Sciences, National Fisheries University of Busan, Vol. 8, 1975, p. 31-38, 2 tab., 6 fig., 18 ref.

Descriptors: Oil, *Oil pollution, Water pollution effects, Mollusks, *Clams, *Metabolism, *Oxygen, Phenols, Sulfides, Animal physiology, *Respiration, Larvae.
Identifiers: *Hard clams, *Crude oil, n-hexane-soluble chemicals, Cleavage, Larval development, Meretrix lusoria, Larval abnormalities, Respiratory metabolism.

Effect of n-hexane-soluble chemicals, phenol and sulfide of crude oil ingredient on cleavage, larval development and oxygen consumption of Meretrix lusoria was examined. In the medium of 3 ppm n-hexane-soluble chemicals, occurrence of abnormalities were totally 47.1% compared to those of the control. They were 21.4% and 25.7% in cleavage and larval development stage, respectively. In the medium of 5 ppm, they were 28.6% and 31.7% in cleavage and larval development stage respectively, and totally 60.3%. In the medium of 10 ppm phenol, occurrence of abnormalities were totally 43.1% compared to those of the control. They were 13.8% and 29.3% in cleavage and larval development stage respectively. Oxygen consumption of isolated gill tissue showed 19.8% decrease at 3 ppm and 25.9% at 5 ppm n-hexane-soluble chemicals respectively. Its oxygen consumption at 10 ppm phenol showed 29.1% decrease in regards to the control. Respiratory metabolism was seriously inhibited by sulfide that 21.2% decrease was measured in 0.05 ppm sulfide. In case of -.5 ppm, 42.8% decrease was found. (Katz)
W77-04052

PETROLEUM COMPONENTS AND OBJECTIONABLE MALODOROUS SUBSTANCES IN FISH FLESH POLLUTED BY BOILER FUEL OIL,
Okayama Univ. (Japan). Dept. of Public Hygiene.
M. Ogata, and T. Ogura.
Water Research, Vol. 10 (1976), p 407-412, 2 tab., 7 fig., 5 ref.

Descriptors: Oil, *Oil pollution, Water pollution, Public health, Laboratory techniques, Marine fish, Commercial fisheries, *Eels, Laboratory animals, Gas chromatography, Bioassay, *Taste, Fuels, Pollutant identification.
Identifiers: Fish flesh, Fish flesh pollution, *Boiler fuel oil, *Malodorous, Substances, Girella punctata, Anguilla rostrata, Unsaturated aliphatic hydrocarbons, Aromatic hydrocarbons, *Green fish.

Green fish (Girella punctata) and eel (Anguilla rostrata) were reared in two types of artificially oil-polluted test dilutions for the purpose of measuring the petroleum substances infiltrating the flesh. One test dilution contained untreated mineral oil and the other test dilution contained residue mineral oil after chemical treatment. Vapours from fish flesh samples were analyzed by gas chromatography. Unsaturated aliphatic hydrocarbons and some aromatic hydrocarbons were revealed as sources of the repugnant odour. (Katz)
W77-04053

ONTOGENETIC VARIATION IN THE MULTIPLE HEMOGLOBINS OF COHO SALMON (ONCORHYNCHUS KISUTCH) AND EFFECT OF ENVIRONMENTAL FACTORS ON THEIR EXPRESSION,
Concordia Univ. Montreal (Quebec). Canada, Dept. of Biological Sciences.
M. A. Giles, and W. E. Vanstone.
Journal of the Fisheries Research Board of Canada, Vol. 33 (1976) p 1144-1149, 2 tab., 3 fig., 28 ref.

Descriptors: *Salmon, Oxygen, *Thermal stress, *Thermal pollution, Salinity, *Electrophoresis, Physiological ecology, Genetics, Juvenile fish, Animal physiology, Biochemistry, Water pollution effects.
Identifiers: *Coho salmon, Micro-starch-gel electrophoresis, Hemoglobin, Smoltification.

Hemolyzates from the blood of coho salmon (Oncorhynchus kisutch) at various stages of development were subjected to micro-starch-gel electrophoresis. Three distinct electrophoretic patterns composed of different combinations of 18 hemoglobin tetramers were observed. Embryonic and yolk-sac alevins possessed 1 cathodic and 12

anodic components while fry retained only 3 of the 12 anodic polymorphs. During smoltification, 4 new cathodic components appeared and 2 of the anodic and the cathodic components of alevin hemolyzates reappeared. This latter pattern was retained until the fish spawned and died. Attempts to induce changes in the pattern of development of these hemoglobins by exposing fry and presmolts to extreme variations in dissolved oxygen, temperature, and salinity were completely unsuccessful. (Katz)
W77-04054

STUDY OF THE PRODUCTION PROCESS OF DAPHNIA LONGIREMIS SARS POPULATION FROM LAKE DALNEE BY MEANS OF A MATHEMATICAL MODEL, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Physiology.
T. I. Prikhod'ko.
Gidrobiol Zh 11(4), p 32-39, 1975.

Descriptors: Daphnia, *Mathematical models, Biomass, *Productivity, Predation, Lakes, Water pollution.
Identifiers: *Daphnia-longiremis, *USSR(Lake Dalnee).

A mathematical model was used to determine annual dynamics of the number, biomass and production of the D. longiremis population. The modeling results are compared with the observational data for the real population. The model is used to study the effect of changes in the value of food reserves and the influence of predation production (USSR).--Copyright 1976, Biological Abstracts, Inc.
W77-04055

THE EFFECT OF AMMONIA EXPOSURE ON GILL STRUCTURE OF THE RAINBOW TROUT (SALMO GAIRDNERI),
Bristol Univ. (England). Research Unit for Comparative Animal Respiration.
G. Smart.
Journal of Fishery Biology, Vol. 8, 1976, p. 471-475, 7 fig., 34 ref.

Descriptors: *Rainbow trout, Freshwater fish, Pathology, Animal physiology, *Toxicity bioassay, Mortality, Water pollution, Path of pollutants, Water pollution effects, Oxygen, *Ammonia.
Identifiers: *Gill structure, Gill damage, Acutely lethal concentrations, *Toxic mechanisms, Long-term exposure, Histopathological changes, Disease incidence.

Gill structure has been studied in fish exposed to various ammonia concentrations. Gill damage resulting from exposure to acutely lethal concentrations was relatively minor and unlikely to have been a primary cause of death. Alternative toxic mechanisms have been discussed. Following long-term exposure to ammonia there were severe histopathological changes in gill structure and oxygen uptake may have been seriously impaired. A high incidence of disease was also observed. (Katz)
W77-04056

TRACE METALS (AS, CD, CU, FE, AND ZN) IN ARCTIC COD, BOREOGADUS SAIDA AND SELECTED ZOOPLANKTON FROM STRATHCONA SOUND, NORTHERN BAFFIN ISLAND,
British Columbia Research Council, Vancouver. Div. of Applied Biology.
A. Bohn, and R. O. McElroy.
Journal of the Fisheries Research Board of Canada, Vol. 33, 1976 p 2836-2840, 3 tab., 2 fig., 5 ref.

Descriptors: *Metals, Arsenic compounds, *Cadmium, *Copper, *Iron, *Zinc, Zooplankton, Marine fish, Cold-water fish, Arctic Ocean, Physiology, Copepods, *Trace elements.
Identifiers: *Arsenic, *Cod, Boreogadus saida, *Arctic cod, Northern Baffin Island, *Strathcona Sound, *Trace metals.

Arctic cod (Boreogadus saida) were captured by bottom trawl at depths of 120-300 m. Zooplankton were obtained by bottom to surface tows from the Arctic cod habitat. Average concentrations of arsenic (As) and zinc (Zn) were higher in Arctic cod fillets than in livers from the same fish: cadmium (Cd) and iron (Fe) concentrations were higher in livers. The difference between copper (Cu) concentrations in muscle and liver was not significant. As and Zn in whole fish and As in fillets from seven specimens were positively correlated to body weight. Cu and Fe in whole fish were negatively correlated to body weight, whereas Cd was not related to body weight. Examination of Arctic cod stomach contents indicated that planktonic copepods were important in the diet. Cd levels were 5-8 times higher in the unsorted copepods than in the Arctic cod, whereas As, Cu, Fe, and Zn were higher in the fish than in the copepods. (Katz)
W77-04057

DISTRIBUTION OF HEAVY METALS IN TISSUES OF THE COMMON SEAL,
Liverpool Univ. (England). Dept. of Botany.
T. M. Roberts, P. B. Heppleston, and R. D. Roberts.
Marine Pollution Bulletin, Vol. 7(10), 1976, p. 194-196, 1 tab., 3 fig., 24 ref.

Descriptors: *Lead, *Cadmium, *Mercury, Atlantic Ocean, Mammals, *Heavy metals, Water pollution effects, Path of pollutants, Biochemistry, Laboratory tests, Animal physiology, Distribution.
Identifiers: *Common seal, Phoca vitulina, Tissue levels of lead, Tissue levels of cadmium, Tissue levels of mercury, West Scotland.

The lead, cadmium and mercury content of soft tissues and bone were determined for the common seal (Phoca vitulina) collected from off the coast of East Anglia and the West of Scotland. Lead levels were low in all tissues, cadmium accumulated with age in the kidney of West Scotland seals and mercury accumulated to high levels in the liver of seals from both areas. Comparison of our results with those of other workers, suggests that the rate of mercury accumulation in the liver of seals increases in the order: Canadian Arctic and Atlantic coast < West Scotland < East Anglia < Netherlands coast. Accumulation of mercury in the kidney and spleen of older seals, lends tentative support to the hypothesis that a protective demethylation and retention process in the liver may begin to leak mercury to other tissues at the high concentrations which have been recorded in the liver of older seals, and at the high dose rates which have been used in toxicological experiments. (Katz)
W77-04059

MERCURY IN TISSUES OF MUSSEL OFF SOUTHERN CALIFORNIA,
Southern California Coastal Water Research Project, El Segundo, Calif.
R. P. Eganhouse.
Marine Pollution Bulletin, Vol. 7(8), 1976, p. 145-147, 1 tab., 2 fig., 8 ref.

Descriptors: *Mercury, *Heavy metals, Water pollution, *Mussels, Mollusks, Intertidal areas, Sewage, *California, Water pollution effects, Laboratory tests, Pollutant identification.
Identifiers: Intertidal mussel, Tissue mercury contents.

Total mercury content has been determined in three tissues of the intertidal mussel Mytilus californianus collected at locations along the southern California coast and at island control stations. The apparent influence of certain harbours and municipal wastewater outfalls was reflected by the relatively higher levels of mercury in all tissues of mussels from these areas. In general, the concentrations reported here are lower than those in mussels on west European coasts. (Katz)
W77-04060

PETROLEUM-DEGRADING ACHLOROPHYLLOUS ALGA PROTOTHECA ZOPFI,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W77-04062

SOME EFFECTS OF PETROLEUM ON ESTUARINE AND MARINE MICRO-ORGANISMS,
Maryland Univ., College Park. Dept. of Microbiology.
J. D. Walker, and R. R. Colwell.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A016 501, Price codes: A02 in paper copy, A01 in microfiche. Canadian Journal of Microbiology, Vol. 21(3), 1975, p. 305-313, 6 tab., 4 fig., 13 ref.

Descriptors: Oil, *Oil pollution, Water pollution effects, Aquatic microorganisms, Marine microorganisms, Soil bacteria, Oil spills, Waste disposal, *Chesapeake Bay, Yeasts, Fungi, Estuaries, Sediments, Marshes.
Identifiers: *Estuarine microorganisms, Oil-contaminated sediments, Petroleum hydrocarbons, *Crude oil, No. 2 fuel oil.

Degradation of mixed hydrocarbon substrate in a system comprising water from an environment relatively free of oil and a sediment inoculum from an oil-contaminated site was significantly greater than when sediment from the non-oil-contaminated environment served as inoculum. Mixed hydrocarbon substrate, however, was observed to have a limiting effect on the growth of autochthonous bacteria from the non-oil-contaminated estuarine source. Growth and cell yield were similarly reduced when marine sediment bacteria were cultured in seawater supplemented with mixed hydrocarbon substrate. The addition of a South Louisiana crude oil or a No. 2 fuel oil to water and sediment collected from a marsh area of Chesapeake Bay showed no limiting effects on growth of the total heterotrophic microbial flora when examined over a 28-day period. (Katz)
W77-04063

MICROBIAL PROCESSES OF PHENOL DEGRADATION IN THE VOLGA AND ITS RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
A. K. Stolbunov.
Gidrobiol Zh 12(1), p 33-39, 1976.

Descriptors: *Phenols, *Biodegradation, Bacteria, *Microbial degradation, Reservoirs, Water pollution.
Identifiers: USSR, *Volga River.

In the Volga River (USSR) the number of heterotrophic phenol-degrading bacteria was as follows: in the polluted sections-about 80-230,000 cells/ml, in moderately polluted sections-900-50,000 cells/ml, and in pure sections-500-7000 cells/ml. The degradative activity for the same sections constituted 70-100%, about 30% and about 20% of phenol degradation under standardized conditions, respectively. The latter values characterize adaptibility of water microflora to degradation of phenols of autochthonous origin. Allochthonous phenol biodegradation is more extensive (in the Rybinsk reservoir (about 20 km from the pollution source)) than under river conditions (in the Volga near Gorky (about 100 km)).--Copyright 1976, Biological Abstracts, Inc.

W77-04064

INVESTIGATIONS ON THE INFLUENCE OF SALT CONCENTRATION ON THE ACTIVITY OF BACTERIAL POPULATIONS FROM FRESH AND WASTE WATERS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
K. Gocke.
Kiel Meeresforsch 30(2), p 99-106, 1974.

Descriptors: Rivers, Effluents, Salinity, Salts, Sewage, *Bacteria, Coasts, Growth rates, Nutrients, *Self purification.
Identifiers: *Saprophytic bacteria.

Activity and number of saprophytic bacteria in relation to salt concentration were measured in river water containing various levels of NaCl. The salinity requirements of the 10 most frequently occurring bacteria were determined. The growth rate of natural bacterial populations in relation to the salt concentration was measured after nutrient addition. The activity and the number of bacteria were strongly inhibited with increasing salt concentrations. Only a slight adaptation was found. With higher amounts of nutrients rapid changes in the population were observed. Bacterial populations carried into the sea by rivers and sewage effluents apparently can play only a minor role in the self-purification of coastal waters.--Copyright 1976, Biological Abstracts, Inc.
W77-04065

STUDY ON THE LONG-TERM EFFECTS OF SOME DETERGENTS ON THE SEQUENCE OF DEVELOPMENT OF THE SEDENTARY POLYCHAETE, CAPITELLA CAPITATA (FABRICIUS), (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
J. P. Foret.
Tethys 6(4), p 751-778, 1974.

Descriptors: *Detergents, Water pollution effects, *Lethal limit, Growth rates, Growth stages.
Identifiers: Amines, *Capitella-capitata, Esters, Maturation, Metamorphosis, Ovocytes, *Polychaetes, Propylene.

The sublethal effects of 6 detergents were tested on the life cycle of the polychaete C. capitata. This species is characteristic of polluted bottom areas. Specimens are obtained from natural populations and studied in the laboratory. The tested detergents, issued from the oil industry, are 3 anionic (alkylarylsulfonate, lauric alcohol sulfate, fatty alcohol oxyalkyl ester) and 3 non-ionic (oxyethylene oxypropylene amine, polyethylene glycol ester, oxyethylene alcohol). The short duration of the life cycle of C. capitata permits proposal of a method for qualitative and quantitative evaluations of these pollutants' sublethal effects. The disturbing effects depend on the concentrations and stage of the life cycle. When the concentration increases, the length of the different phases increases and decrease in the number of juveniles is observed. The more susceptible stages are maturation of the ovarian tissue and ovocytes and metamorphois.--Copyright 1976, Biological Abstracts, Inc.
W77-04067

RADIOECOLOGICAL STUDY OF CHAROPHYTA, (IN RUSSIAN),
Akademiya Nauk Litovskoi, SSR, Vilnius. Inst. of Botany.
D. P. Marchyulenene, R. F. Dushauskene-Duzh, and N. A. Chibiraite.
Gidrobiol Zh 12 (1), p 12-19, 1976.

Descriptors: *Radioecology, Algae, *Radioactivity, Absorption, Radioisotopes, *Path of pollutants, Cytological studies, Phytoplankton, Cladophora, Reservoirs, Water pollution.
Identifiers: *Charophyta, Duckweed, Elodea.

Accumulation of 90 Sr, 144 Ce, 137 Cs and 106 Ru in Charophyta depends on the species, while accumulation of 90 Sr and 137 Cs depends on sampling time and vegetative period. The accumulation level and the degree of removal of 90 Sr and 137 Cs in Charophyta depend on the amount of exchange of Ca and K, respectively, and the concentration of these elements in the water. 90 Sr and 137 Cs uptake by Charophyta cells occurs during short-term experiments due to absorption on a cell membrane and to intense ion exchange between the environment and cellular components; the 144 Ce and 106 Ru uptake by the Charophyta cells occurs in short-term values for aquatic plants notable for high mineralization (Charophyta) appear to be approximately 16 times as high under natural conditions at those under experimental conditions; the accumulation factor (AF) values of 90 Sr for aquatic plants of a rather low mineralization (phytoplankton, Cladophora, Elodea and duckweed) were the same under experimental and natural conditions. Apparently the AF differences of 90 Sr in aquatic plants under experimental and natural conditions depends chiefly on the amount of mineral substances in them. Charophyta appears to be an important link in radionuclide migration in reservoirs and useful for studying processes and mechanisms of radionuclide accumulation.--Copyright 1976, Biological Abstracts, Inc.
W77-04068

ESTIMATION OF THE PRODUCTION POTENTIALS OF THE PHYTOBENTHOS IN THE NORTHERN DONETS-DONETS BASIN CANAL,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
R. A. Kalinichenko.
Gidrobiol Zh 12(1), p 98-102, 1976.

Descriptors: *Bentho, *Photosynthesis, *Cyanophyta, *Diatoms, *Productivity, *Chlorophyta, Biomass, Algae, *Canals, Water pollution.
Identifiers: Cladophora-fracta, Cladophora-glomerata, Diatoma-vulgare, Enteromorpha-intestinalis, Hydrodictyon-reticulatum, Melosira-varians, Navicula-cryptocephala, Nitzschia-sigmoidea, Nitzschia-vermicularis, Dedogonium, Oscillatoria-princeps, Phormidium-autumnale-Funcinata, Spirogyra-Sp, *USSR, *Donets River Basin Canal(USSR).

The photosynthetic activity of the microphytobenthos in the Northern Donets-Donets Basin canal (USSR) during the domination of blue-green algae and diatoms (Navicula cryptocephala, Diatoma vulgare, Melosira varians, Nitzschia sigmoidea, Nitzschia vermicularis, Phormidium autumnale f. uncinata, Oscillatoria princeps)average 0.121 mgO2/mg biomass-day in the spring, 0.272 mgO2/mg-day in the summer and 0.044 mgO2/mg-day in the winter. The photosynthetic activity of green filamentous algae (Cladophora fracta, C. glomerata, Enteromorpha intestinalis, Spirogyra sp., Oedogonium, Hydrodictyon reticulatum) was lower and averaged 0.0167, 0.0474 and 0.0100 mgO2/mg dry weight/day in the spring, summer and winter, respectively. No clear dependence between the photosynthetic activity and biomass was noted. The significant photosynthetic activity of the phytobenthos in the canal facilitates the rapid formation of algal films and accumulations on the concrete and crushed rock.--Copyright 1976, Biological Abstracts, Inc.
W77-04069

PRIMARY PRODUCTION OF GREEN FILAMENTOUS ALGAE FROM THE KIEV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. E. Kostikova.
Gidrobiol ZH 12(1), p 62-70, 1976.

Descriptors: *Primary productivity, *Chlorophyta, Reservoirs, Biomass, Algae, Water pollution.
Identifiers: Cladophora-crispata, Cladophora-fracta, Cladophora-glomerata, Epiphytes, Filamentous algae, Hydrodictyon-reticulatum, Mougeotia-laetevirens, Oedogonium-Sp, Oedogonium-vaucherii, Russian-sfsr, Spirogyra-Crassa, USSR, *Kiev Reservoir(USSR).

Cladophora fracta Kuetz., C. glomerata (L.), Kuetz., C. crispata Kuetz., Oedogonium vaucherii (Le Cl.) Al. Br. Wittr., Oedogonium sp., Spirogyra crassa Kuetz., Hydrodictyon reticulatum Lagerh., Mougeotia latevirens (A.Br.) Wittr., and their epiphytes produce about 90% of the total biomass of the filamentous algae in the Kiev reservoir (Russian SFSR, USSR). Using the diurnal production determined in various months of the vegetative period, total production was calculated from 1 m2 of a algal vegetation.--Copyright 1976, Biological Abstracts, Inc.
W77-04070

MEROMICTIC MECHANISMS IN A COASTAL LAKE, (IN FINNISH),
Abo Akademi, Turku (Finland). Inst. of Biology.
T. Lindholm.
Zool Revy 38(1), p 3-10, 1976.

Descriptors: Lakes, *Meromixis, Salinity, Halocline, Sea water, Nutrients, Phytoplankton, *Saline water intrusion, Primary productivity, Water pollution.
Identifiers: *Finland, *Coastal lakes.

The fjordlike coastal lake Vastra Kyrksundet (Aland, SW Finland), isolated from the Baltic by land upheaval probably 100 yr ago, was reconnected with the sea with a small canal in 1932. The lake (area 60 ha, maximum depth 18 m) is now meromictic with a halocline between 4-8 m. The salinity of the stagnant anoxic water is rather constant, slightly above 4.0%, but the salinity of the surface water fluctuates 0.3-3.3%. The salinity and the halocline are regulated by the amount and the periodicity of affluent fresh water and by the water level fluctuations of the Baltic which determine the pattern and magnitude of seawater influxes. Certain influxes of seawater cause an uplift of some stagnant, nutrient-rich water increasing the phytoplankton primary production.--Biological Abstracts, Inc.
W77-04071

DATA ON SEASONAL VARIATIONS IN PLANKTON AND ON THE HYDROLOGIC CHARACTERISTICS OF THE NORTH SEA, OFF OSTENDE AND NIEUWPOORT: PERIOD FROM 1969 TO 1971, (IN FRENCH),
Brussels Univ. (Belgium). Lab. of Comparative Anatomy.
R. Segebarth-Orban.
Ann Soc R Zool Belg 105 (1/2), p 193-227, 1975.

Descriptors: Plankton, *Chlorophyll, *Sampling, *Zooplankton, *Copepods, *Nutrients, *Phytoplankton, Larvae, Rivers, Estuaries, Seasonal, Water pollution.
Identifiers: Appendicularia, *Belgium, Bivalves, Nieuwpoort, Ostende, Polychaetes, *North Sea.

Samples were taken at various stations off Nieuwpoort and Ostende (Belgium). Meterological conditions, current, seasonal variations in salinity and mineral salt concentrations were described. Chlorophyll-a concentrations were highest in Aug. of the 1st year and in Oct. of the 2nd year. Copepods made up the highest average fraction of zooplankton, then copepod nauplii, bivalve larvae, polychaete larve and Appendicularia, in decreasing order. A comparison of the sampling stations showed that all followed similar fluctuation curves and that water freshening, nutrient element concentrations and the quantity of phytoplankton were highest in the coastal stations and decreased

as the distance from the coast increased. This phenomenon was attributed to the emptying of several rivers in the area under study.--Biological Abstracts, Inc.
W77-04072

ROLE OF THE MINERAL NUTRIENTS CONTRIBUTED BY THE RIVER RHONE (FRANCE) TO THE ORGANIC PRODUCTION OF THE WATERS OF THE GULF OF LIONS, (IN FRENCH),
B. Coste.
Tethys 6(4), p 727-740, 1974.

Descriptors: *Nutrients, *Measurement, *Phosphates, *Nitrates, *Silicates, Photosynthesis, Mineralogy, Carbon, Productivity.
Identifiers: *France, *Minerals, *Rhone River(France), Gulf du Lion(France).

Measurements of nutrients (phosphates, nitrates and silcates) were carried out for 3 yr on the Rhone River. Experimental work on dilution processes shows that absorption, desorption or fluccolation of P compounds do not occur. The amount of photosynthetic C computed from the nutrient content of the fresh water and referred to the dilution area is about 30-45 g C/m2/yr. This additional supply makes the Golfe du Lion the most productive zone of the western basin of the Mediterranean.--Biological Abstracts, Inc.
W77-04073

A STUDY ON THE INFLUENCE OF SALINITY FLUCTUATIONS UPON THE BACTERIAL FLORA OF THE LAGOON CIENAGA GRADE DE SANTE MARTA (COLOMBIA) AND THE ADJACENT COASTAL REGION, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 5B.
W77-04076

MICROBIOLOGICAL AND CHEMICAL STUDY OF WATER IN THE BAIA DE ARIES MINE, (IN ROMANIAN),
Societatea de Stiinte Biologice din R.S.R., Bucharest.
For primary bibliographic entry see Field 5A.
W77-04077

BACTERIAL ASSIMILATION OF ORGANIC MATTER IN WATERS WITH VARIOUS POLLUTION LEVELS, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W77-04081

ROLE OF POPULATIONS OF PLUMATELLA FUNGOSA (PALLAS) (BRYOZOA, PHYLACTOLEMA) IN THE SELF-PURIFICATION OF A POND AND A STREAM, (IN FRENCH),
Liege Univ. (Belgium). Laboratories de Morphologie, de Systematique et d'Ecologie Animales.
For primary bibliographic entry see Field 5G.
W77-04083

SOME PROBLEMS OF SANITARY MICROBIOLOGY, (IN RUSSIAN),
For primary bibliographic entry see Field 5A.
W77-04085

VARIATIONS IN CD, PB AND CU CONTENT OF WATERS OF THE LOWER ESTUARY OF THE SAINT LAWRENCE DURING THE SUMMER OF 1972, (IN FRENCH),
Quebec Univ., Rimouski. Dept. of Oceanography; and Quebec Univ., Rimouski. Dept. of Pure Sciences.
For primary bibliographic entry see Field 5A.
W77-04086

ON THE FAUNA OF A FRESHWATER FLAT IN THE ELBE ESTUARY (GERMANY), (IN GERMAN),
Hamburg Univ. (West Germany). Museum of Zoology.
O. Pfannkuche, H. Jelinek, and E. Hartwig.
Arch Hydrobiol 76(4), p 475-498, 1975.

Descriptors: *Cyanophyta, Europe, Algae, Diatoms, Estuaries, Marine algae, Nutrients, Marine animals, Water pollution effects.
Identifiers: Colonization, *Elbe estuary(W. Germany), Flagellate, Scirpus.

Investigations were made on the fauna and abiotic milieu of the freshwater flats of Faehrmannssand in the Elbe estuary (West Germany, near Hamburg). The area consists of extensive sand and mudflats. The latter are mainly covered with Scirpus. The open mudflats are usually covered with bluegreen algae, flagellates and diatoms. The fauna is represented by eurytopic freshwater organisms, especially saprobic species, and by marine immigrants. The colonization of this unique biotope by rather unspecialized animals and their relations to environmental conditions are discussed. Regarding the geographical and nutritional relations, the ecological characteristics of the fauna are discussed and classified. The considerable effect of the freshwater flats for regeneration of the polluted Elbe water and their importance as feeding and breeding areas for the river fauna are emphasized.--Copyright 1976, Biological Abstracts, Inc.
W77-04087

BACTERICIDAL ACTION OF ELECTROHYDRAULIC EFFECT IN WATER, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR).
S. N. Cherkinskii, G. P. Yakovleva, A. N. Mel'Nikova, G. F. Savel'Eva, and A. A. Semenova.
Gig Sanit 2, p 7-10, 1976.

Descriptors: *E coli, *Bactericides, Bacteria, Water pollution effects.
Identifiers: *Electrohydraulics.

Autoclaved spring water contaminated with Escherichia coli was subjected to electrohydraulysis with discharges of 80, 100 and 200 J, which was strongly bactericidal with 25 impulses (81.7%, 96.1% and 99.85%, respectively) despite a high initial contamination level. The dependence of the bactericidal effect on the initial contamination level did not differ significantly in all observations. The hydraulically treated water showed a bactericidal aftereffect which increased with increasing exposure time; a reliable effect was observed 15 h after contamination and it increased to 80.5% during 24 h.--Copyright 1976, Biological Abstracts, Inc.
W77-04088

THYROID MODIFICATIONS IN RATS AFTER ADMINISTRATION OF MINERAL RESIDUE FROM DRINKING WATER, (IN FRENCH),
Institutul de Igiena si Sanatate Publica, Bucharest (Rumania).
E. Bordas, E. Bretter, and Z. Uray.
Rev Roum Med Endocrinol 13(4), p 271-275, 1975.

Descriptors: *Potable water, Mineralogy, Proteins, *Radioactivity, Water pollution, Rodents.
Identifiers: Goiter, Hormone, Iodine, *Mineral residues, Thyroid.

Over a period of 120 days groups of rats were given mineral residues of water taken from 2 different rural localities where I level was at least 10 micro-g/l. This water was rich in minerals but did not contain significant amounts of known goiter-causing elements. Na131 I was administered just before sacrifice in order to determine thyroid radioiodofixation and the index of conversion of mineral I to protein I. These 2 parameters were reduced in rats given the rural water residues in comparison to the controls. The water from one of the localities was considered to have an antithyroid complex because of its significant inhibition of I fixation and thyroid hormone synthesis.--Copyright 1976, Biological Abstracts, Inc.
W77-04089

MICROBIOLOGICAL CHARACTERISTICS OF THE ROS/ RIVER AND SOME OF ITS TRIBUTARIES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
V. I. Kachan.
Gidrobiol ZH 12(1), p 94-97, 1976.

Descriptors: *Microbiology, *Bacteria, Coliforms, Rivers, Aquatic fungi, Microorganisms, Plankton, Yeasts, Tributaries, Water pollution.
Identifiers: Actinomycetes, Azotobacter, Bacilli, Cocci, *Ros River(USSR), Saprophytes, Ukrainian-SSR, *USSR.

On the basis of total quantity of bacteria, quantity of saprophytes, and coliform-index, the sanitary-microbiological condition of the Ros/ River and 5 major tributaries (Ukrainian SSR, USSR) was determined in 1971. The quantity of microorganisms in the Ros/ basin was primarily affected by the nature and availability of organic substances. Except for a few sections (the upper reaches and below the city of Belaya Tserkov/), the Ros/ was less polluted than its tributaries, which had little effect on the microbiological characteristics of the Ros/. The bacterioplankton of the Ros/ basin included spore-forming bacteria, cocci, Azotobacter-like cells, yeasts, actinomycetes and fungi, with baccilli the dominant form. Data on the sanitary condition of the studied rivers may facilitate the rational placement of commercial enterprises and the planning and implementation of antipollution measures.--Copyright 1976, Biological Abstracts, Inc.
W77-04093

THE USE OF ENZYME-KINETIC-METHODS FOR BACTERIOLOGICAL EXAMINATIONS OF HEAVILY POLLUTED SURFACE WATERS, (IN GERMAN),
Innsbruck Univ. (Austria). Hygienisches Institut.
F. Tiefenbrunner, F. Duesing, J. Krambeck, and J. Overbeck.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/), p 498-518, 1976.

Descriptors: Water pollution, *Bacteria, Enzymes, *Microorganisms, *Nutrients, *Productivity, *Organic matter, Biodegradation, Kinetics, Methodology.
Identifiers: Biotope, *Heterotrophic microorganisms.

The greatest fraction of nutrients dissolved in water are organic substances which are decomposed, transformed and mineralized by heterotrophic microorganisms. Investigations concerning energy transfer in an aquatic ecosystem, or practical examinations of the pollution load of surface waters, cannot be done when based exclusively on counts of microorganisms of the production or destruction group. It is important for heterotrophic bacteria that productivity parameters for these numerical estimations are also provided. For marked test-substrates it was possible to measure the turnover in natural populations. After improvement of the technique in determining the decomposition rates of individual organic substrates, a way was found to determine static descriptions of an aquatic biotope, and to make possible dynamic description of nutrient transfer. The kinetic parameters computed from these measurements are the maximum uptake velocity

(Vmax), the turnover velocity (Tt) and the transport constant (Kt). The maximum uptake velocity of a substrate is the heterotrophic capacity of the biotope for this substrate. Only quickly assimilatable can be used, e.g., hexoses, organic acids, amino acids, etc. The applicability of this technique was tested in polluted biotopes. Whether a decomposition gradient is reflected in the kinetic data was investigated. A small eutrophic lake in the E Holstein Lake District (350 ha, 9.5 m mean water depth) was the test biotope. Emptying into the lake was the runoff of a biological water treatment plant with 12,000 population equivalents and without notable business or industry. In a rectangular investigation area with 30 sampling stations positioned close to the outlet of the water treatment plant into the lake, kinetic tests were carried out at 48 h intervals and compared with bacteriological, chemical and meteorological sample results taken at the same time. Conditions in the biotope are reflected in the kinetic data and at individual sampling stations (corresponding to their distance from the drainage outlet); significant differences in the kinetic data were obtained. The enzyme--kinetic substrate turnover of individually marked substrata is suitable for investigation of polluted biotopes (drainage waters); it permits conclusions regarding the magnitude of the actual course of processes and changing microorganism populations. The heterotrophic system in a polluted biotope is exceptionally flexible and variable in dependency upon complex environmental conditions and is constantly subject to qualitative and quantitative changes. The use of an enzyme-kinetic method in this ecosystem provides the possibility of understanding these rapidly occurring processes. Enzyme-kinetic methods represent a valuable addition to presently-used techniques of assessment of heterotrophic activities in a polluted biotope.
W77-04094

USE OF RECORDING METHOD OF AFTERGLOW OF GREEN ALGAE IN DETERMINING SOIL AND WATER POLLUTION BY PHYTOXIC SUBSTANCES, (IN RUSSIAN),
Moscow State Univ. (USSR). Lab. of Space Biology.
D. N. Matorin, P. S. Venediktov, and M. G. Makevnina.
Biol Nauki (Mosc) 18(12), p 122-125, 1975.

Descriptors: Ureas, *Chlorella, *Bioassay, *Pesticide residues, *Herbicides, Toxicity, Algae, Water pollution, Soils, *Chlorophyta, Methodology, *Phytotoxicity.
Identifiers: Afterglow, Atrazine, Diuron, Fenuron, Heximure, Methurin, Monuron, Prometryne, Propazine, Pyramin, Randox, Simazine.

Active urea derivatives (diuron, monuron, fenuron, methurin), active triazine derivatives (prometryne, atrazine, propazine, simazine) and other preparations (dicryl, 2,4-D, heximure, Pyramin, Randox) in concentrations of 10-7--10-5 M decreased the millisecond glow intensity of Chlorella cells by 50%. This bioassay possibly can determine the presence of herbicide residues in soil quickly and accurately. As compared to chemical methods, it is sufficiently universal, does not require preliminary identification of the toxic chemicals or their metabolites and enables determination of phytotoxic levels based on functional cell disturbances.--Copyright 1976, Biological Abstracts, Inc.
W77-04097

BEHAVIOR OF PATHOGENIC AND SANITARY-INDICATOR BACTERIA UNDER CONDITIONS OF WATER POLLUTION BY ORGANOPHOSPHORUS PESTICIDES, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
E. M. Yurovskaya.
Gig Sanit 9, p 102-103, 1975.

Descriptors: *Bacteria, *Bioindicators, Water pollution, E coli, Microorganisms, *Pesticide residues, Phosphorus, Salmonella, Shigella, Public health, Streptococcus.
Identifiers: Bacilli, Colon, Dysentery, Enterococci, Malathion, Parathion, Pathogenic, Trichlorfon, *Organophosphorus pesticides.

Water pollution by organophosphorus pesticides (trichlorfon, methyl parathion, malathion and their mixtures) in maximum allowable concentrations and in concentrations exceeding them 10-fold at water temperatures of 5-6 and 20-22C did not change the behavior and numerical characteristics of dysentery bacteria, colon bacilli or enterococci. Trichlorfon in a concentration of 1 g/l in river water at 20-22 inhibited the development of Escherichia, fecal streptococci, Shigella and Salmonella A and B. The behavior and properties of indicator microorganisms (colon bacilli, enterococci) in waters polluted with organophosphorus pesticides in comparison with their development in pure water makes them sanitary indicators also in water with the indicated type of pollution.--Copyright 1976, Biological Abstracts, Inc.
W77-04099

TOXICOLOGICAL EFFECTS OF DIETHYLNITROSAMINE (DENA) IN GUPPIES (LEBISTES RETICULATUS), (IN GERMAN),
Deutsches Krebsforschungszentrum, Heidelberg (West Germany). Inst. of Toxicology and Chemotherapy.
H. R. Scherf.
Z Krebsforsch Klin Onkol 86(2), p 155-163, 1976.

Descriptors: *Toxicity, Organic compounds, Water pollution effects, *Lethal limit.
Identifiers: Carcinogens, Guppies, *Lebistes-reticulatus, Lesions, Nitrosamines, Peritoneal cavity, *Amines, *Diethylnitrosome.

In a chronic test, guppies were incubated in darkness in DENA concentrations of 26 and 100 mg/l up to 7 mo. This treatment led to lesions in organs of the peritoneal cavity. Tumors were not observed. The cause of the lack of carcinogenic activity is discussed.--Copyright 1976, Biological Abstracts, Inc.
W77-04100

5D. Waste Treatment Processes

AN INVESTIGATION OF CONDENSATES AND THEIR CONTRIBUTION TO EFFLUENT DISPOSAL FROM SUGAR MILLS. PART II. STUDIES ON THE REMOVAL OF ETHANOL FROM CONDENSATES,
Sugar Research Inst., Mackay (Australia).
J. D. Blake, R. Broadfoot, and D. H. Foster.
International Sugar Journal, Vol. 78, No. 934, p 291-295, October, 1976. 5 fig, 5 tab.

Descriptors: *Condensation, Effluents, *Waste disposal, *Industrial wastes, Mills, Food processing industry, *Alcohols, Laboratory tests, *Waste water treatment.
Identifiers: *Ethanol.

Laboratory pilot-scale trials were performed to study the removal of ethanol from condensates of sugar mills. The procedure adopted was steam-stripping. A steam-stripping still was a glass column packed with Raschig rings. Samples of feed, distillate, and residue were analyzed. Resultant low ethanol levels justified the pilot study. The pilot unit consisted of a 200 mm diameter steel pipe packed to a height of 2.14 meters with 25 mm Raschig rings. It was shown that final ethanol content was limited by ethanol in the exhaust steam which fluctuated as condensates of variable ethanol content were used for steam generation. The problem was solved by using a reboiler to generate steam from the condensate by heat exchange with the exhaust steam previously used. It was necessary to build a hot water trap in the line to the reboiler to reduce 'wetness.' The amount of ethanol depends on the cane quality and results from cane burning to remove trash and the time between burning and milling. Ethanol removal is quite efficient, but BOD levels are a problem since concentration of non-volatiles is unpredictable. The BOD problem reduces the usefulness of stripping, but it can be valuable in providing relatively clean and sterile water for internal factory uses and reducing the loading on normal effluent treatment systems. (Collins-FIRL)
W77-03601

TALL ORDER IN WASTE TREATMENT,
Chemical Week, Vol. 119, No. 19, p 67-68, 70, November 10, 1976.

Descriptors: *Waste water treatment, *Aeration, *Settling basins, *Aerobic bacteria, *Chemical industry, Capital costs, Treatment facilities, Chemical wastes, Sludge treatment, Bubbles.
Identifiers: *Tower biology treatment, *Oxygen utilization, Off-gas treatment.

Bayer AG Chemical Company of West Germany developed a tower biology treatment system for waste water of chemical plants. In this system, waste water and air enter the bottom of the steel tower through special nozzles. The water is broken into small bubbles which provide a greater surface than usual surface aerators. Aerobic bacteria and secondary treatment sustain greater oxygen utilization with more than a 90% reduction of biochemical oxygen demand and suspended solids. Power requirements of this system are also reduced. Treated wastes then spill into a settling basin at the tower top where sludge is removed at the bottom and treated water discharged into a river from the upper portion. An advantage of the system was shown to be better utilization of oxygen in the air stream. The column height is the main criteria of performance, but towers greater than 100 ft provide no increased performance worth the additional cost. A larger diameter has no effect on efficiency. Unused oxygen in the Bayer tower system is 50% of that in injector-aerator horizontal basins. The greater oxygen utilization allows the use of less air and reduces exhaust gases from the top of the tank. Savings result from lower costs for gas treatment and lower incinerator fuel requirements. Capital cost savings of 20% over that for horizontal basins are expected. The injector system is installed in groups of four in rows at the tank bottom, one injector for each 10-21 sq ft of surface area. The settling basin is at the top to aid settling, but sludge is produced in a slightly greater quantity than in horizontal basins. Bayer plans a full-scale operation at its Leverkusen, West Germany headquarters. (Collins-FIRL)
W77-03602

TREATMENT OF TROUBLESOME ODORS FROM THE FERMENTATION OF ANTIBIOTICS (ABBATTIMENTO DI ODORI MOLESTI PROVENIENTI DALLA FERMENTAZIONE DI ANTIBIOTICI),
C. Casalini, G. Mascellani, and V. Michelini.
Inquinamento, Vol. 18, No. 9, p 47-48, September, 1976. 2 fig, 1 tab, 19 ref.

Descriptors: *Treatment, *Odor, *Fermentation, *Antibiotics(Pesticides), *Oxygenation, Water, Absorption, Hydrogen ion concentration.
Identifiers: Soda, Cephalosporin C.

Oxygenated water and soda can be used to chemically absorb troublesome odors from the fermentation of cephalosporin C. The oxygenated water is effective even at low concentrations (under 1%) and at various pHs. In a batch fermentation process, the gas effluents successively pass through 3.5% parts per volume oxygenated water, 3.5% oxygenated water with hydrochloric acid at

pH 1 and sulfuric acid at pH 3, 9-15% parts per volume soda, and 3.5% parts per volume hydrochloric acid. Experimental results indicate that approximately 60-100 g/liter soda and 10-20 g/liter oxygenated water are consumed during one fermentation cycle. Soda consumption is mainly due to the breakdown of carbon dioxide produced by fermentation while that of oxygenated water depends on a number of factors (fluctuations in the fermentation process, pH, degree of contact with the effluent). Practically, this process could be used in two-story wash towers operating on a countercurrent principle. (Waltner-FIRL)
W77-03603

CHEMICAL-INDUSTRY COSTS OF WATER POLLUTION ABATEMENT,
IR and T, Arlington, Va.
J. Cummings-Saxton.
Chemical Engineering, Vol. 83, No. 24, p 106-113, November 8, 1976. 2 fig, 7 tab.

Descriptors: *Chemical industry, *Waste water treatment, *Industrial plants, *Industrial production, *Industrial wastes, *Chemical wastes, Water pollution, Costs, Economic impact, Water pollution control, Treatment facilities, Pollution abatement.

Water pollution abatement in compliance with the standards for effluent limitation in Public Law 92-500 is discussed. Since not all companies incur the same cost increase, and since they may have differing degrees of flexibilty in allocating the cost of pollution abatement, price adjustment affects competition within the industry. Abatement costs for a given chemical vary depending on the number, type, and production volume of other products manufactured at the same facility. Water intake per unit output has consistently declined in the chemical industry, with an accelerated reduction during 1968 to 1973. A chemical input-output table (CIOT), a plant data matrix, and an estimate of obsolescence had to be developed to translate the plant-level costs into aggregate industry expenditures. Sales for each chemical, both for production of other chemicals and other applications, are identified in the CIOT. Effluent standards will probably result in a more rapid plant depreciation cycle, because standards are presently only slightly more severe for new plants than for existing plants. Expenditures for water pollution abatement from 1973 to 1983 are estimated at 171% of the 1975 planned total expenditures for new plants and equipment by the chemical industry. Yearly costs associated with Public Law 92-500 were estimated at $4094 million by 1983. New facilities can readily incorporate improved process designs that minimize residual generation. (Snyder-FIRL)
W77-03604

THE USE OF MACRORETICULAR POLYMERIC ADSORBENTS FOR THE TREATMENT OF WASTE EFFLUENTS,
Rohm and Haas Co., Philadelphia, Pa.
R. Kunin.
Pure and Applied Chemistry, Vol. 46, No. 2-4, 1976. 15 fig, 5 tab, 4 ref.

Descriptors: *Polymers, *Adsorption, *Waste water treatment, *Effluents, *Ions, *Ion exchange, Resins, Pores, Porosity, Porous media, Chemical industry, Chemical wastes, Recycling.

A significant advance in ion exchange resin and adsorbent technology is the development of the macroreticular pore structure. Various synthetic routes exist for preparing both ion exchange resins and polymeric adsorbents of high surface area and pore volume. Surface area and pore parameters can be varied over a wide range. Several macroreticular polymers based on the crosslinked styrene and acrylate systems are now commercially available. They are hard, durable, insoluble spheres of high surface area and porosity. They are available in various polarities. When adsorbing from polar solvents, the nonpolar adsorbents are particularly effective for nonpolar solutes and polar adsorbents are very effective for polar solutes. Polymeric adsorbents are being studied for numerous applications, including treatment of waste effluents. The use of these polymeric adsorbents for the treatment of wastes from the petrochemical, chemical, dye, and paper manufacturing industries is of particular interest. It has been demonstrated in some instances that significant quantities of reusable chemicals can be recovered that more than pay for the waste treatment application. One such application is the use of the polymeric adsorbents for the treatment of phenolic wastes. The adsorbents are also used for the removal of chlorinated pesticides, TNT residues, and other noxious compounds from waste effluents and water supplies. (Snyder-FIRL)
W77-03605

PURIFICATION OF WINE DISTILLERY EFFLUENTS (EPURATION DES EFFLUENTS DE DISTILLERIES VINICOLES),
Industries Alimentaires et Agricoles, Vol. 93, p 906-908, July/August, 1976. 1 fig.

Descriptors: *Distillation, *Food processing industry, Industrial plants, *Industrial wastes, *Effluents, Treatment facilities, Neutralization, Coagulation, Flocculation, *Waste water treatment, Water purification.
Identifiers: *Wine distillery effluents, Flotation.

ERPAC has installed a dregs treatment plant at the wine distillery of the Vallee du Calavon a Maubec. Primary treatment involves neutralization, coagulation, flocculation, flotation , and separation of the flocculated substances from the clear effluent. Treatment consists of aeroflotation followed by compaction. The sludge contains 10% solids after flotation and 30% solids after compaction. It then passes into a rotary dryer to produce concentrated sludge pellets. The clear effluent is evaporated. (Waltner-FIRL)
W77-03606

NESTLE AND POLLUTION CONTROL,
Water and Waste Treatment, Vol. 19, No. 9, p 47-48, September, 1976.

Descriptors: *Waste water treatment, *Sewerage, *Biochemical oxygen demand, *Treatment facilities, *Water pollution control, Industrial plants, Food processing industry, Color, Waste water(Pollution).

The Nestle Company installed a waste water treatment system in its Freehold, New Jersey, coffee plant which reduces the BOD and removes the color of waste water. The system consists of a boiler which generates 100,000 lb/hr saturated steam. Coffee grounds are fired at 60 to 66% moisture. The boiler design allows coffee grounds to be burned below the oil firing line so that waste gases from the grounds will be consumed. Fly ash collectors further reduce contamination from this source. The steam produced is recycled to heat water used in coffee production. When the state instituted a regional waste disposal program as well as the addition of a reservoir, stream standards were upgraded. This caused a problem in that the waste water was then too dark. Increased loads also became too much for the local municipal treatment plant. The company installed a separate sewage system to separate industrial waste from the total flow to the local plant. These wastes were directed to sand lagoons near the treatment plant, but it was found that they were on low land with little drainage. This problem was solved by diverting the colored water to a spray system and a multiple effect evaporating system that takes preconcentrated wastes mixed with oil and evaporated to dryness. The product is separated from the oil and burned in the previously mentioned boiler. The resultant water is then treated at the local treatment plant during off-peak hours. (Collins-FIRL)
W77-03607

TREATMENT OF PUTREFACTIVE MEAT AND FISH WASTE -- FOR PREPARATION OF MANURE, ANIMAL FEEDS AND FUEL OIL,
Belgian Patent BE-842-053. Issued Sept. 16, 1976. Derwent Belgian Patents Report, Vol. X, No. 41, p D3, November 17, 1976.

Descriptors: *Industrial wastes, *Patents, *Treatment facilities, *Waste water treatment, *Fertilizers, Oil, Equipment, Odor, Food processing industry, *Feeds.

A process and apparatus to treat putrefactive waste from raw fish and meat was patented. It can treat such material rapidly without causing odor. The waste from domestic or industrial kitchens moves between grinding rollers and into a chute, then to an endless screw type grinder. Solids are separated and move through dehydrating rollers to an ultraviolet sterilizing chamber; they are dried by hot air in a perforated drum on their way to a receptacle. The separated liquid flows to a stirrer where a deodorizing liquid is added to the mixture, goes to a header tank, and then to a concentrating tank where the pressure is reduced. Oil and water are separated by centrifugation and flow to separate reservoirs. The by-products may be used as fertilizer or animal feed. The oil recovered can be burned as fuel; the water can be further purified. (Snyder-FIRL)
W77-03608

PILOT SCALE HIGH GRADIENT MAGNETIC FILTRATION OF STEEL MILL WASTEWATER,
Sala Magnetics, Inc., Cambridge, Mass.
J. R. Harland, L. Nilsson, and M. Wallin.
IEEE Transactions on Magnetics, Vol. MAG-12, No. 6, p 904-906, November, 1976. 5 fig, 4 ref.

Descriptors: *Waste water treatment, *Separation techniques, *Suspended solids, *Steel, *Pilot plants, Filters, Recycling, Magnetic studies, Oil wastes, Mills.
Identifiers: *Magnetic filtration, Flow velocity, Hot rolling steel mills.

The removal of fine suspended solids in waste water of a steel mill was tested in a pilot project. A full-scale facility would consist of two filters operating in parallel. Waste water would be pumped through the filter matrix where solids are removed. The treated water could be recycled or discharged. The theory of operation suggests that ferro- or para-magnetic particles are removed when high magnetic fields develop near the surface of filamentary ferromagnetic fibers which make up the filter bed. Pilot tests studied flow velocity and the background magnetic field of the separator matrix. It was shown that cycle length is proportionally shorter as flow velocity increases and increases when the magnetic field increases. The system traps more solids than a sand filter. A large amount of oil is removed since lubricating oils in rolling mills coat metal and metal oxide surfaces. Oil removal is more efficient with higher initial solids concentration. It takes about 20% of the water used to flush a sand filter to flush the high gradient magnetic separator. The advantages of the system are high flow velocity and low space requirements, useful in upgrading mills where space is limited; no need for chemicals as with clarifiers; no need for major pretreatment; and no moving parts which reduce maintenance costs. (Collins-FIRL)
W77-03609

REVERSE OSMOSIS FOR THE TREATMENT OF METAL WASTE SOLUTIONS,
Department of Energy, Mines and Resources, Ottawa (Ontario). Extraction Metallurgy Div.
V. S. Sastri.
Journal of Scientific and Industrial Research, Vol. 35, No. 2, p 88-90, February, 1976. 37 ref.

Descriptors: *Reverse osmosis, *Waste water treatment, *Capillary action, *Pores, *Membranes, Surfaces, Salts, Pressure.

Principles and applications of reverse osmosis applied to the treatment of metal waste solutions are considered. There are two basic schools relative to reverse osmosis. One is that capillary flow mechanism is linked to the appropriate chemical nature and the existence of pores of appropriate size on the membrane surface. Because of the physico-chemical interaction of the membrane and solution, salt rejection is effected and water can be removed under pressure through the membrane capillaries. The second is that the solution-diffusion mechanism requires that solute and solvent dissolve in the membrane and permeate through the nonporous surface layer by homogeneous diffusion. The second approach is limited in its success. Physico-chemical criteria for ion separation are not completely developed. Several factors which affect the stability of membranes are hydrolysis, pressure, bacteria, temperature, and surface coating. Reverse osmosis can be applied in the treatment of electroplating waste solutions in water pollution control and metal recovery, in the treatment of acid mine water, and in processing solutions of several solutions used in photographic processing plants for chemical recovery. Suggestions were made for future investigations. (Collins-FIRL)
W77-03610

SOLIDIFYING SLUDGE CONTAINING HEAVY METALS -- BY TREATING WITH SULPHUR COMPOUNDS, COLLOIDAL SULPHUR AND BITUMINOUS EMULSION.
French Patent FR 2292-674. Issued July 30, 1976. Derwent French Patents Abstracts Vol. X, No. 41, p D6, November 17, 1976.

Descriptors: *Sludge, *Sludge treatment, *Heavy metals, *Sulfur compounds, *Sulfur, Colloids, Emulsions, *Patents.

A process was patented that includes adding a sulfur compound or compounds, a bituminous emulsion, and colloidal sulfur to sludge that contains harmful substances like heavy metals or arsenic for aggregating and solidifying it. Harmful substances such as arsenic and heavy metals, whether hard to dissolve or soluble in water, are made hard to solve or insoluble by adding colloid sulfur, the sulfur compound, or aggregating force of abituminous emulsion and then separated from water. The separated solids are compactly combined and do not collapse in water, so it can be used as reclamation material or water-preventive wall material. (Snyder-FIRL)
W77-03611

CONTINUOUS BOWL-TYPE CENTRIFUGES FOR THE CLARIFICATION AND DEHYDRATION OF SLUDGES FROM THE PAPER INDUSTRY (CENTRIFUGEUSES CONTINUES A BOL PLEIN POUR CLARIFICATION ET DESHYDRATION DES BOUES DANS L'INDUSTRIE PAPETIERE).
Papier, Carton et Cellulose, No. 10, p 68-70, October, 1976. 4 fig.

Descriptors: *Centrifugation, *Dehydration, *Sludge, Pulp and paper industry, *Industrial wastes, Biological treatment, Treatment facilities, Effluents, *Waste water treatment, Pulp wastes.
Identifiers: Clarification.

Sludges resulting from the physiochemical or biological treatment of paper effluents must be dehydrated for storage. The bowl-type centrifuge with endless screw can clarify and dehydrate any type of primary and most primary-secondary sludges (paper paste, biological, and drinking sludges). The addition of flocculants such as polyelectrolytes makes the process 99% effective. Turbulence has been eliminated by replacing countercurrent flow with parallel flow where the sediments and clarified water move through the cylinder in the same direction, separate without turbulence, and are then directed into separate channels. The advantages of a bowl-type centrifuge include continuous processing, no filters, large loads, and savings in energy, space, and wear. (Waltner-FIRL)
W77-03613

CHARACTERISTICS OF EFFLUENTS FROM CONVENTIONAL AND OXYGEN BLEACHING SEQUENCES,
National Council for Air and Stream Improvement, Gainesville, Fla. Southern Research Center.
For primary bibliographic entry see Field 5A.
W77-03614

POTENTIALS OF USING SPENT OXYGEN BLEACHING LIQUOR IN THE SULPHITE PROCESS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshelennosti, Leningrad (USSR).
G. L. Akim, T. A. Bystrova, L. D. Zonova, and I. M. Uljantseva.
Svensk Papperstidning, Vol. 79, No. 14, p 466-479, October, 1976. 6 tab.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Industrial wastes, *Bleaching wastes, Biochemical oxygen demand, Pollution abatement, Liquid wastes, Recycling, Color.
Identifiers: Alkali-oxygen stage.

In paper production, it was shown that spent bleach liquors from the alkali-oxygen stage could be used for the preparation of sulphite cooking acid for rayon pulp from hardwood and softwood. It was most suitable as a prebleaching stage for sulfite pulps and can replace the chlorination and extraction stages. This proved to be an efficient pollution abatement procedure. It eliminated effluents from the chlorination stages; caused an absence of dark colored products from conventional bleaching procedures; and reduced the number of final bleaching stages, reagent consumption, and the amount of organic substances in the final bleaching process. As a base for the cooking acid, the alkali-oxygen spent liquors produce a high-grade pulp. Alkali-oxygen spent liquors have higher values of oxidizability, biological oxygen demand, chemical oxygen demand and color index. With biochemical processing, hypochlorite stage and acid treatment waste waters, as well as 5% of spent liquors enter the drain for disposal. Biological purification is more efficient here than with conventional bleaching procedures. The organic matter from this liquor may be used to neutralize the spent liquor and incubate yeast in combination with the sulfite liquor. (Collins-FIRL)
W77-03615

SOLVENT AND SOLVENCY -- A SOLUTION TO SLUDGE PROBLEMS,
D. Moraski.
Canadian Pulp and Paper Industry, Vol. 29, No. 11, p 36-37, November, 1976. 2 tab.

Descriptors: Pulp and paper industry, *Waste water treatment, *Solvents, *Sludge, *Industrial wastes, Waste water(Pollution), Sludge disposal, Pulp wastes, Recycling, *Sewage treatment, *Pulp wastes.

As a result of requirements on the pulp and paper industry to remove greater amount of solids from waste water, the quantity and variety of sludges has grown enormously to create an immense and immensely expensive waste disposal problem. One plant handling 35 dry tons/day of primary sludges in 1970 handles 50 dry tons/day of primary and secondary sludges in 1976. Dewatering, drying, and disposal methods designed with cheaper fuel and lower environmental awareness often have drawbacks including high operating costs, inadequate capacity, negative environmental impact, and inability to handle the low-solids, hard-to-filter sludges produced in secondary treatment. B.E.S.T. (Basic Extractive Sludge Treatment) capitalizes on the special properties of the solvent triethylmine (TEA) to improve sludge dewatering. TEA and water mix completely below 18C; when warmed, however, they form two distinct and easily separated layers. At approximately -7C, the solvent greatly enhances the ability of the solids particles to separate from the water in which they are bound. In most cases, the value of the dried sludge as a fuel is substantially greater than the total energy costs of the B.E.S.T. system. Because solvent replaces a high percentage of the water in the wet cake, and because TEA evaporation requires only 133 BTUs per lb, compared with 1000 BTUs per lb of water, final drying is quicker and less expensive. After drying, the solvent is collected and reused. Filtration rates for TEA-treated samples are appreciably greater than those for untreated samples. Where B.E.S.T. is used to process 50 dry tons/day sludge containing 20% solids, the fuel value of the product equals approximately $28.80 per dry ton. (Snyder-FIRL)
W77-03616

PURIFYING AND REGENERATING GASEOUS AND FLUID PHASE EFFLUENTS -- SUCH AS AMMONIA MIXTURES FROM WOOL PROCESSING, MERCERISING ETC.
French Patent FR 2292-503. Issued July 30, 1976. Derwent French Patents Report, Vol. X, No. 41, p J1, November 17, 1976.

Descriptors: *Patents, *Gases, *Effluents, *Ammonia, *Industrial wastes, Industries, Liquid wastes, Distillation, *Waste water treatment.

A process involving several interconnected steps is patented to purify industrial waste effluent having at least two phases, one liquid and the other gaseous. The gas phase is converted to a liquid phase; liquid phases are fractionally distilled to extract pure vaporized substances. Each of the pure substances is condensed to liquid state; the distillates are collected separately to form separate stock, usable as internal feed-back primer, for fractional distillation; part of or all condensate is removed and cooled by heat exchange before collection. Where the gas is a mixture its density may be increased before it is passed through a column, in counterflow with an absorbent fluid or solvent, to separate all impurities. Then the solution is fractionally distilled, and the absorbent or solvent recovered, topped up with new material, and recycled. The distillate can be heated to the boiling point for vaporization by heat exchange. Before distilling each fluid phase, pressure may be mechanically raised so that gaseous distillate can condense at ambinent temperature. Under high pressure this gaseous distillate may be detented, simultaneously vaporizing the part that is mixed in gaseous form with the gas being cooled. The plant is inexpensive to set up and run. It is fully automatic, requiring very little maintenance and supervision. (Snyder-FIRL)
W77-03617

EVALUATION OF WASTEWATER TREATMENT FACILITIES.
Industrial Water Engineering, Vol. 13, No. 4, p 29-33, August/September, 1976. 3 fig, 7 tab.

Descriptors: *Treatment facilities, *Industrial wastes, *Waste water treatment, *Textiles, *Chemical industry, Energy, Design, Costs, Evaluation.
Identifiers: Zero discharge, Facilities upgrading.

A systematic/integrated approach was recommended for evaluating waste water treatment facilities, as applied to both chemical and textile plants. The basic elements of this approach are design of industrial waste water systems and the

operation of these systems. The eventual target of such programs should be zero-discharge, but due to the huge economic requirements of this ideal, its achievement is not mandatory. Other aspects of a system evaluation include selection of the treatment process after determining system needs through an energy audit; the next step involves comparing feasible alternatives. Consideration should also be given to energy requirements, system design and current condition of equipment, operating procedures, and operating policies. This technique was applied to a textile plant which was ordered to upgrade its treatment facilities. Corrective action involved a reduction in water consumption, preheating boiler feedwater from a waste water stream, and insulation of steam, condensate, and hot water mains. The results were a net savings in overall plant costs after the upgrading of the treatment system. (Collins-FIRL)
W77-03619

IN-PLANT, OUTSIDE POLLUTION EVILS, ENERGY SAVING TOP AATCC CONCERNS.
For primary bibliographic entry see Field 5G.
W77-03620

A NEW LABORATORY DEVICE FOR WASTE WATER ANALYSES (RESPIROMETER). PART II. MEASUREMENTS WITH BATCH OPERATION (UJ LABORATORIUMI SZENNYVISVIZSGALO KESZULEK (RESPIROMETER) II. RESZ. MERESEK SZAKASZOS UZEMMOD MELLETT),
For primary bibliographic entry see Field 5A.
W77-03621

SECTION 208 PROGRAM REVIEW, (ENVIRONMENTAL PROTECTION AGENCY), (DRAFT).
Environmental Protection Agency, Washington, D. C. Program Evaluation Div.
Available from the National Technical Information Service, Springfield, VA 22161, as PB-250 788, Price codes: A04 in paper copy, A01 in microfiche. December 12, 1975, 48 p.

Descriptors: *Federal Water Pollution Control Act, *Water treatment, *Administrative agencies, *State governments, Governmental interrelations, Legislation, Water pollution, Treatment, Waste water treatment, Quality control, Water pollution control, Water quality, Wastes, Waste treatment, Legal aspects, Federal jurisdiction, Planning, Water management(Applied), Budgeting, Administration.

Section 208 of the Federal Water Pollution Control Act Amendments of 1972 was promulgated to foster the development and implementation of areawide waste treatment management plans. At the request of the Office of Water Planning and Standards, the Program Evaluation Division undertook a review under Section 208. The Division concluded that most grantees will not be able to complete all of the complex planning tasks demanded by Section 208 in the time allotted for preparation of the initial plan. The following reasons were given: (1) expectations for the program were overly ambitious; (2) many of the funded agencies lacked appropriate staff, organization and experience in the water pollution area; (3) practical limitations on what can be accomplished at the local level through areawide planning; and (4) inherent constraints in the legislation. The Section 208 program has a high potential for the dissipation of meager resources in the pursuit of complex objectives. The success of the program depends on EPA's ability to focus the efforts of grantees through a clearer definition of the program requirements. (Cowart-Florida)
W77-03686

BPT: CONSIDER THE ALTERNATIVES (BEST PRACTICAL TREATMENT CRITERION).
Journal Water Pollution Control Federation. Vol 46, No 5, p 808-810 May 1974. 3 p.

Descriptors: *Waste water treatment, *Waste water(Pollution), *Waste water disposal, *Waste disposal, *Water quality standards, Water quality control, Water purification, Water resources, Water reuse, Water law, Treatment facilities, Treatment, Technology, Environmental engineering, Environmental control.
Identifiers: *Administrative regulations.

The 'best practicable treatment' concept (BPT) will soon be a major determinant in the funding of publicly owned wastewater treatment projects and in the processing of applications for discharge permits. Evaluated in this area is the Environmental Protection Agency (EPA) report concerning BPT. No definitive guidelines as to what treatment qualifies as BPT were given by EPA; instead, the report examined three technological approaches. These were: land utilization and land application; treatment and discharge; and reuse technology. A municipality, in order to qualify for federal funds, must use the report to choose its own alternative treatment approach but must also follow the cost-effectiveness regulations. Emphasis is placed upon land treatment techniques along with an in depth discussion of the costs and capabilities of land treatment. The EPA report also concentrates on what may be the three water quality problems likely to remain after the application of the 1977 secondary treatment controls: oxygen-demanding materials, nutrients, and fecal coliform. BPT can not be set for reuse projects and any criteria for such will be determined by the medium into which reused water is ultimately discharged. (Welch-Florida)
W77-03690

THE POTENTIAL FOR NUCLEAR AND GEOTHERMAL POWER PLANT SITING IN IDAHO AS RELATED TO WATER RESOURCES,
Idaho University, Moscow, Dept of Civil Engineering.
For primary bibliographic entry see Field 3E.
W77-03730

DESIGN AND OPERATIONAL CRITERIA FOR THICKENING OF BIOLOGICAL SLUDGES,
Clemson Univ., S. C. Dept. of Environmental Systems Engineering.
T. M. Keinath.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 967, Price codes: A04 in paper copy, A01 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 62, September 1976. 63 p, 35 fig, 6 tab, 22 ref. S-051-SC.

Descriptors: *Activated sludge, Waste water treatment, Costs, Sedimentation, Designs, Operations, Design criteria, Biological treatment, Sludge treatment, Aeration, Settling basins, Capital costs, Operating costs.
Identifiers: Clarification, Thickening.

A unique procedure for designing and operating the activated sludge aeration basin/clarifier system is developed using the settling flux approach. A least-cost design procedure, utilizing batch settling tests and the state point concept, produces a design solution which minimizes capital and operational costs. In addition, the settling flux approach provides the plant operator with a tool for control and operation of the clarifier/thickener to improve treatment efficiencies and prevent operational failures.
W77-03734

HYGIENIC ASSESSMENT OF THE DESTRUCTION PRODUCTS OF SURFACTANTS IN WATER OZONIZATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
A. A. Korolev, M. V. Bogdanov, and B. R. Vitvitskaya.
Gig Sanit 1, p 16-20, 1975.

Descriptors: *Toxicity, Public health, Water pollution, *Surfactants, *Ozone, *Potable water, Organoleptic properties, *Waste water treatment, *Water treatment.
Identifiers: *Ozonization.

In the course of ozonization of water contaminated with surface active agents at concentrations above 2-3 mg/1, destruction products are formed, as the result of which the water acquires odors. The products of ozone destruction of surface active agents are less toxic and less cumulative than the original agents and they have no allergenic properties. The organoleptic index (the smell) should be considered as the most important on in hygienic assessment of water containing products of ozone destruction of surface active agents. This study is applicable to drinking water for humans. Tests were done in rats and mice.--Copyright 1976, Biological Abstracts, Inc.
W77-03772

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE COPPER, NICKEL, CHROMIUM, AND ZINC SEGMENT OF THE ELECTROPLATING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W77-03775

PURIFICATION OF EFFLUENTS FROM THE MANUFACTURE OF PAPER AND BOARD BY ELECTROCHEMICAL METHOD (OCHISTKA STOCHNYKH VOD KARTONNOGO-BUMAZHNOGO PROIZVODSTVA ELEKTROKHIMICHESKIM METODOM),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev, (USSR).
V. G. Selivanov, V. P. Svitel'skii, V. G. Ryumin, and N. V. Samborskii.
Bumazhnaya Promyshlennost, No. 8, p 24-25, August, 1976. 1 fig.

Descriptors: *Pulp wastes, *Waste water treatment, *Electrochemistry, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Electrodes, Stainless steel, Oxygen, Hydrogen, Chlorine, Cathodes, Anodes, Coagulation, Suspended solids, Flotation, Disinfection, Chemical oxygen demand, Biochemical oxygen demand, Microbiology, Energy, Pulp and paper industry, Effluents.
Identifiers: Graphite, White water(Paper machines), Fiber recovery.

The purification equipment for white water described consists of a unit for two-stage mechanical and electrochemical fractionation (recovery of fibers and removal of finely dispersed and colloidal particles, respectively) and a clarifier unit equipped with an assembly of graphite anodes and stainless steel cathodes. This unit operates with direct current through a rectifier at 14-15 volts, 40-50 amperes, and a current density of 20-30 milliamperes/sq cm. The flow rate is 0.8 m/hr. Hydrogen is evolved at the cathode, oxygen and chlorine at the anode, and there is a continuous upward stream of gases which causes flotation of the suspended solids. Simultaneously, there is electrocoagultion with formation of particle flocks. An electric precipitator is mounted at the outlet to retain the flocks. The white water is also disinfected by the action of atomic oxygen and

chlorine. Analyses have shown reductions of the suspended solids content to 2-4 mg/liter, of COD by up to 64%, of BOD by up to 69%, and of microbial count by 99%. The energy consumption for the treatment of 1 cu m of white water is approximately 1 kw/hr. (Stapinski-IPC)
W77-03789

REDUCTION OF FRESH WATER CONSUMPTION AT THE KONDOPOGA MILL FOR THE MANUFACTURE OF PULP (OPYT RABOTY KONDOPOZHNOGO KOMBINATA PO COKRASHCHENIYU RASCHODA SVEZHEI VODY V TSELLYULOZNOM PROIZVODSTVE),
Kondopozhskii Kombinat (USSR).
For primary bibliographic entry see Field 3E.
W77-03790

MANUFACTURE OF BOXBOARD IN A CLOSED WATER CYCLE (PROIZVODSTVO KOROBOCHNOGO KARTONA PRI ZAMKNUTOM VODOOBOROTE),
Suoyarvskaya Kartonnaya Fabrika (USSR).
For primary bibliographic entry see Field 3E.
W77-03791

PURIFICATION OF TECHNICAL PAPER MILL EFFLUENTS (OCHISTKA STOCHNYKH VOD FABRIKI TEKHNICHESKIKH BUMAG),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev (USSR).
V. P. Svitel'skii, R. P. Ptitsa, V. A. Kovba, T. D. Sokirko, and D. A. Samsonov.
Bumazhnaya Promyshlennost No. 7, p 23-25, July, 1976. 2 fig, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Sedimetation, Filtration, Coagulation, Flocculation, Lime, Foreign countries, Suspended solids, Dissolved solids, Effluents, Pulp and paper industry, Water pollution control, Dyes.
Identifiers: Aluminum sulfate, Polyacrylamide, Colored papers, *USSR.

Effluents from the Koryukovka mill (USSR), which produces polyethylene-treated papers, colored papers, and corrosion-inhibitor papers, contain fillers, dyes, emulsifiers, stabilizers, binders, and other chemicals. Effluents from the manufacture of corrosion-inhibitor papers are burned. The other effluents are subjected to mechanical clarification (sedimentation) and filtration through sand filters. A study was conducted by the Ukrainian Research Institute of the Pulp and Paper Industry to develop a suitable method for treatment of the highly polluted effluents, particularly effluents from the manufacture of colored papers. Tests with various coagulants and flocculants were conducted. The best results were obtained by treatment with lime, aluminum sulfate, and polyacrylamide in amounts of 150, 150, and 4 mg/liter, respectively. When treated by this sequence, the purified effluents had a suspended solids content of 10-30 mg/liter, dissolved substances content of 600-650 mg/liter, and an oxidizability of 42-52 mg oxygen/liter. Such a treatment should constitute only the first purification stage and should be followed by biological purification. (Stapinski-IPC)
W77-03792

A SCHEME FOR EFFECTIVE CONTROL OF EFFLUENT PH,
Celanese Chemical Co., Bishop, Tex.
A. A. Iverson, and S. Ochisi.
Instrument Society of America, Advances in Instrumentation, Annual Conference (Houston, Texas), Vol. 31, Part 4, Paper No. 861, 5 p, ISA (Pittsburgh), October 11-14, 1976. 8 fig, 12 ref, 1 tab.

Descriptors: *Hydrogen ion concentration, *Effluents, *Control systems, *Automatic control, Monitoring, Regulation, Instrumentation, Waste water treatment, Wastes, Waste treatment, Water pollution treatment, Industrial wastes, Chemical industry, Diffusion, Discharge(Water).
Identifiers: Sulfuric acid.

An automatic pH control system has been designed for effluent streams flowing in a canal system inside a chemical plant. At one location, sulfuric acid is added to the stream, and a pH probe is placed ca. 250 m downstream. A cascade control system incorporating a nonlinear controller is used to manipulate the acid flow rate. The diffusion characteristics of a flowing stream are used in lieu of forced mixing. A second pH sensor, used as an effluent monitor, is located ca. 1 km downstream of this control system. By using this system, the effluent has met applicable pH specifications prior to being discharged outside the plant. (Brown-IPC)
W77-03802

DESIGN OF AN EFFICIENT WATER SYSTEM FOR A KRAFT PULP MILL,
Main (Charles T.), Inc., Boston Mass.
J. S. Lunde.
TAPPI Engineering Conference, Houston, October 4-7, 1976, Preprinted Proceedings Book I (TAPPI, Atlanta, Ga.), p 217-222. 3 fig.

Descriptors: *Water conservation, *Pulp and paper industry, *Water reuse, Costs, Economics, Recycling, Waste water treatment, Steam, Water consumption(Except consumptive use), Industrial water, Water management(Applied), Water utilization, Effluents.
Identifiers: *Kraft mills.

For a long time the conservation and reuse of water at kraft pulp mills was not practiced because of high capital and operating costs. At present, due to rising energy costs and environmental constraints, efficient reuse and recycling of water streams can be advantageous, because it can reduce overall water consumption, minimize effluent volumes to be treated, and optimize low-level heat recovery, thereby decreasing steam usage. Quantitative and qualitative methods used to design an efficient water reuse system are analyzed, and examples are given of alternate modes of operation of unit processes and how they can affect the overall water, steam, and effluent streams. (Witt-IPC)
W77-03804

CHLORINE-BASED BLEACHERY EFFLUENT TREATMENT,
Champion International Corp., Stamford, Conn.
H. A. Fremont.
United States Patent No. 3,986,951. October 19, 1976, 5 p. 2 fig, 5 claims, 2 tab.

Descriptors: *Bleaching wastes, *Waste water treatment, *Patents, Wastes, Industrial wastes, Water pollution treatment, Water pollution control, Chemical precipitation, Aluminum, Ions, Suspended solids, Organic compounds, Electrodialysis, Separation techniques, Sodium chloride, Chlorine, Water pollution sources, Waste treatment, Chlorides, Sodium compounds.
Identifiers: Sodium hypochlorite, Sodium hydroxide.

A method is provided for treating the effluent from a pulp-bleaching system which uses only a chlorine compound and sodium salts. The process involves adding aluminum ion (e.g., as aluminum chloride) to the effluent in an amount sufficient to precipitate all of the organic materials and suspended solids; separating the solids from the effluent; electrodialyzing the effluent to provide two effluent streams, one containing 200-600 ppm sodium chloride which can be returned to the bleach plant, and a second concentrated stream containing 5-10% by weight sodium chloride; evaporating the concentrated stream to about 25% sodium chloride, and electrodialyzing the concentrated solution to produce chlorine gas, sodium hypochlorite, and sodium hydroxide. (Lynch-IPC)
W77-03806

A SURVEY OF PULP AND PAPER INDUSTRY ENVIRONMENTAL PROTECTION EXPENDITURES AND OPERATING COSTS - 1975,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
R. O. Blosser.
NCASI Special Report No. 76-05, 14 p, June, 1976. 4 tab.

Descriptors: *Pulp and paper industry, *Air pollution, *Water pollution control, *Costs, *Environmental control *Environmental engineering, *Treatment facilities, *United States, *Expenditures, *Pollution abatement, *Operating costs, Capital costs, Economics, Waste treatment, Waste water treatment, Research and development, Surveys, Data collections.

This report summarizes the findings of the National Council's survey of industry expenditures during 1975 for air and water pollution control and solid waste disposal. Capital expenditures envisioned for 1976 through 1978 are projected. Information is given on amortization, tax relief, and financing of pollution-abatement equipment and facilities. In 1975, a total of $706,000,000 were spent in operating, fixed, administrative, and research costs for environmental protection. On a 1975 production basis, these costs exceeded $10 per ton of paper and paperboard manufactured, which is approximately 25% more than was spent in 1974. (Witt-IPC)
W77-03807

GREAT LAKES (PAPER CO.) PIONEERS TOMORROW'S TECHNOLOGY,
F. Stevens.
Pulp and Paper Canada, Vol. 77, No. 11, p 27-33, 35-36, 38-39, 42, 45-46, 49-50, November, 1976. 8 fig, 10 illus.

Descriptors: *Pulp wastes, *Water conservation, *Water pollution control, *Canada, Foreign countries, Pollution abatement, Water reuse, Recycling, History, *Pulp and paper industry, Treatment facilities, Great Lakes, *Lake Superior.
Identifiers: *Kraft mills, Closed systems, *Thunder Bay(Ont).

A detailed illustrated description is given of the No. 2 kraft mill at Great Lakes Paper Co. (Thunder Bay, Ontario), scheduled for startup in November/December, 1976, which incorporates numerous modern technological features, notably the Rapson-Reeve closed-cycle system for eliminating water pollution. The engineering development of these innovations and the historical background of the installation are outlined. (Brown-IPC)
W77-03809

PREPARATION OF FERTILIZERS FROM EFFLUENT SLUDGES OF FERMENTATION PLANTS (POLUCHENIE UDOBRENII IZ SHLAMOVYKH OTKHODOV GIDROLIZNOGO PROIZVODSTVA),
For primary bibliographic entry see Field 5E.
W77-03810

PURIFICATION OF RESIDUAL LIQUOR FROM YEAST PRODUCTION (OCHISTKA POSLEDROZHZHEVOI BRAZHKI),
L. I. Solov'eva, O. V. Kazakevich, and L. F. Sekretareva.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 14-16, 1976. 1 fig, 4 tab.

Descriptors: *Yeasts, *Waste water treatment, *Biological treatment, Wastes, Industrial wastes, Waste treatment, Activated sludge, Aeration, Fungi, Biochemical oxygen demand, Water pollution treatment, Water pollution sources, Water pollution control, Economics, Water pollution, Microorganisms, Treatment facilities, Fermentation, Effluents, Oxidation.
Identifiers: Trichosporon cutaneum, Fermentation industry.

Residual liquor from yeast cultivation constitutes 40% of the effluents of the Lesozavod biochemical plant, and contains 85% of the total BOD load. In a study of the best means to purify the residual liquor, three methods were tested, namely, air blowing, activated sludge treatment, and biochemical oxidation with a pure culture of Trichosporon cutaneum isolated from the mixed microflora of the yeast-growing tanks. Only a slight reduction of the liquor oxidizability could be obtained by the two first methods. Oxidation with the fungus under laboratory conditions reduced the oxidizability 38-45% and the 5-day BOD 42%. Under industrial conditions, with continuous flow of the residual liquor through the Trichosporon culture, the reduction of the 5-day BOD (initially 1200-3000 mg) was 50-70%, the reduction of oxidizability 20-30. The procedure for isolation and cultivation of the fungus and the biochemical oxidation process are described. This method of purification requires no special investments, as the normal equipment of the yeast-producing plant is used. Contamination of the equipment is prevented by sterilization of the fungus-containing tanks with chlorine. (Stapinski-IPC)
W77-03811

SYNTHETIC FLOCCULANTS FOR THE PURIFICATION OF KRAFT MILL EFFLUENTS (SINTETICHESKIE FLOKULYANTY DLYA OCHISTKI STOCHNYKH VOD SUL'FATNOTSELLYULOZNOGO PROIZVODSTVA),
E. A. Korosteleva, N. P. Dymarchuk, V. P. Semenov, and M. M. Krunchak.
Bumazhnaya Promyshlennost, No. 9, p 21-22, September, 1976. 2 fig, 2 tab.

Descriptors: *Flocculation, *Pulp wastes, *Waste water treatment, Wastes, Industrial wastes, Waste treatment, Pulp and paper industry, Effluents, Water purification, Chemical precipitation, Polymers, Chemicals, Organic compounds, Water pollution control, Water pollution treatment, Water pollution sources.
Identifiers: *Polyacrylamide, Molecular weight, Carboxyl groups, Aluminum sulfate.

Polyacrylamide (PAA) is widely used as a flocculant in the purification of kraft pulping effluents and white water. However, commercial PAA preparations differ in their molecular weight and their content of carboxyl groups. To determine the requirements for PAA as a flocculant, its flocculating effectiveness was studied as a function of the molecular weitht and carboxyl group content. The study was conducted on a model kraft mill effluent, using 12.6 mg/liter aluminum sulfate as the coagulant, and 10 PAA preparations including 6 preparations obtained in the laboratory under conditions excluding the presence of carboxyl groups and having molecular weights from 1.68 to 4.75 million, and 4 commercial preparations with molecular weights from 1.02 to 3.0 million and a carboxyl content of 7.3-13%. The dose of PAA was varied from 5 to 35 mg/liter. According to the results, PAA suitable as a flocculant of kraft mill effluents should have a molecular weight of 4,000,000-6,000,000 (intrinsic viscosity 10.4-12.7 dl/g) and contain not more than 10% carboxyl groups. The optimum dose of PAA depends on the molecular weight and the degree of hydrolysis, and is generally lower for preparations of high molecular weight. (Stapinski-IPC)
W77-03812

AERATED PONDS FOR FINAL PURIFICATION OF WOOD CHEMICAL PLANT EFFLUENTS (AERIRUEMYE PRUDY DLYA DOOCHISTKI STOKOB LESOKHIMICHESKIKH PREDPRIYATII),
G. S. Kudryavtsev, N. K. Molodtsov, M. F. Morozov, and P. S. Fokin.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 19-21, 1976. 1 fig, 3 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Aeration, Wastes, Industrial wastes, Biochemical oxygen demand, Chemical industry, Water pollution sources, Water pollution treatment, Water purification, *Aerated lagoons, Sedimentation, Operation and maintenance, Treatment facilities, Phenols, Suspended solids, Costs, Operating costs, Capital costs, Effluents, Foreign countries, Pulp and paper industry.
Identifiers: *Wood industry, *USSR.

A 5-day BOD of over 10 mg/liter is too high for industrial effluents that have been purified biochemically. Such effluents should be subjected to additional purification. For example, biologically purified effluents of the Arkhangel'sk pulp and paper mill and the Bratsk wood-processing complex (USSR) have a 5-day BOD of 12-17 mg/liter; those of the Ashinsk and Syava wood chemical plants have a 5-day BOD of 30-45 and 10-20 mg/liter, respectively. Additional purification can be achieved by physical, chemical, physicochemical, and biological methods. The first three require complex equipment, expensive chemicals, high capital investments, and are costly to operate. For this reason, pilot-plant experiments were conducted at the Syava plant using the biochemical method, i.e., additional purification in aerated ponds. The plant effluent from the secondary sedimentation tanks passed to an aeration chamber where it was aerated for 20 min with compressed air. The aerated effluent was then directed into two parallel ponds, each consisting of a sedimentation section and three oxidation sections. The construction of the ponds is illustrated and their operation is described. This treatment reduced the BOD by 48%, volatile phenols by 50%, and suspended solids by 67%. The cost of the industrial equipment is estimated at 7.5% of the cost of the existing purification equipment, and the increase of operating costs at about 16%. (Stapinski-IPC)
W77-03813

USE OF EFFLUENTS FROM FERMENTATION PLANTS FOR FIELD IRRIGATION (ISPOL'ZOVANIE STOCHNYKH VOD GIDROLIZNYKH ZAVODOV DLYA OROSHENIYA POLEI),
V. T. Dodolina, V. I. Rakushina, L. M. Zakhartsova, V. G. Sinitsyn, and M. M. Malyutin.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 17-19, 1976. 3 tab.

Descriptors: *Irrigation water, *Effluents, Alfalfa, Corn(Field), Sudan grass, Wastes, Industrial wastes, Water pollution sources, Wastes water disposal, Disposal, Waste water treatment, Biological treatment, Sedimentation, Crop response, Irrigation effects, Waste dilution, Hydroponics, Water pollution control, Fermentation.
Identifiers: Fermentation industry.

Field experiments are described in which crops such as alfalfa, corn, and Sudan grass were irrigated with effluents from two fermentation plants. The effluents from one plant had been purified biologically, while effluents from the other plant had been subjected only to mechanical purification (sedimentation in ponds). The effluents, which contained up to 200 mg/liter nitrogen, 100 mg/liter potassium, and 75 mg/liter phosphorus, were used undiluted and diluted 1.5-fold to 2-fold. Irrigation at a rate of 2000-3000 kg/ha increased the yield of the crops 1.5-fold to 3-fold. Depending on the type of soil, the effluents may require preliminary treatments, such as neutralization, storage, or removal of some toxic substances. In most cases, however, simple dilution with river water is sufficient. The nutrients contained in this liquid fertilizer are easily absorbed. The fertilizers resemble hydroponic systems, and this explains their high effectiveness. (Stapinski-IPC)
W77-03814

ELECTROCHEMICAL PURIFICATION OF EFFLUENTS FROM THE MANUFACTURE OF SULFITE AND KRAFT PULPS (ELEKTROKHIMICHESKAYA OCHISTKA STOCHNYKH VOD OT PROIZVODSTVA SUL'FITNOI I SUL'FATNOI TSELLYULOZY),
A. D. Venderevskii, V. N. Syrovatko, and T. P. Pershina.
Bumazhnaya Promyshlennost, No. 8, p 25-26, August, 1976.

Descriptors: *Pulp wastes, *Sulfite liquors, *Electrochemistry, *Waste water treatment, Water pollution sources, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Chemical oxygen demand, Hydrogen ion concentration, Electrodes, Color, Water purification, Pulp and paper industry, Effluents, Energy.
Identifiers: Black liquors, Spent sulfite liquors, Spent pulping liquors.

Earlier studies at the All-Union Research Institute of the Pulp and Paper Industry (USSR) have indicated that bleaching effluents can be effectively purified by electrochemical treatment. Results are discussed obtained in a similar study on spent pulping liquors diluted to a concentration corresponding to that of pulp washing effluents. The starting materials were spent sulfite liquor (SSL) with a COD of 113,250 mg/liter and a pH of 2.5, and black liquor with a COD of 112,250 mg/liter and a pH of 11.5. Dilutions of up to 100 were used. Experiments were conducted with Mg, Al, and Fe electrodes. The effectiveness of the electrodes depended on the initial pH. In the case of black liquor, the Mg electrode gave the best results, while in the case of SSL the Al electrode was the best. The degree of purification in terms of percentage COD and color reduction increased with dilution, but decreased in terms of absolute reduction and required a higher specific energy consumption. This can be explained by the lower salt concentration and conductivity of dilute solutions. Results obtained with a 50-fold dilution of SSL and a 100-fold dilution of black liquor (i.e., at concentrations corresponding to pulp washing effluents) indicated that the pulp washing effluents can be effectively purified by the electrochemical treatment. (Stapinski-IPC)
W77-03815

UTILIZATION OF THE SPENT SULFITE LIQUOR COMPONENTS IN THE PEKILO PROTEIN PROCESS AND THE INFLUENCE OF THE PROCESS UPON THE ENVIRONMENTAL PROBLEMS OF A SULFITE MILL,
K. Forss, and K. Passinen.
Paperi ja Puu, Vol. 58, No. 9, p 608-609, 611-612, 615-618, September, 1976. 11 fig, 4 ref, 10 tab.

Descriptors: *Sulfite liquors, *Proteins, *Byproducts, Wastes, Industrial wastes, Pulp wastes, Pulp and paper industry, Fermentation, Filtration, Carbohydrates, Biochemical oxygen demand, Effluents, Water pollution sources, Water pollution treatment, Water pollution control.
Identifiers: *Pekilo process, Sulfite mills.

The Pekilo process produces a microbiological mass containing about 60% proteins, plus some B-vitamins. The filamentous structure of the microfungus (Paecilomyces varioti or a similar species) facilitates quantitative separation of the product from the fermented spent sulfite liquor by filtration. A sulfite mill with an annual pulp production of 100,000 tons can produce 10,000-

15,000 tons/year of Pekilo protein by fermentation of spent sulfite liquor carbohydrates. The influence of fermentation on effluent BOD and composition of evaporator condensates is also discussed. (Brown-IPC)
W77-03816

POSSIBLE USES FOR FIBROUS SLUDGES FROM THE PULP AND PAPER INDUSTRY,
For primary bibliographic entry see Field 5E.
W77-03817

EXPERIENCES IN CLOSING THE WATER SYSTEM IN A PAPER AND BOARD MILL (ERFAHRUNGEN BEI DER KREISLAUFSCHLIESSUNG EINER PAPIER- UND KARTONFABRIK),
P. L. Model.
Das Papier, Vol. 30, No. 10, p 426-429, October, 1976. 1 fig, 1 illus. English summary.

Descriptors: Pulp and paper industry, *Water conservation, Water pollution sources, Foreign countries, Europe, Water pollution control, Sedimentation, *Water pollution treatment, Filtration, Corrosion, Effluents, Water management(Applied), *Pulp wastes, Water consumption(Except consumptive use).
Identifiers: *Switzerland, Closed systems, Paper mills, Board mills.

The conversion of the paper and board mill of Model AG. at Weinfelden, Switzerland, to a closed water system is described. The effluents from the paper and board mill, kept separate from domestic and yard wastes, are treated in a special sedimentation plant, followed by rotating and multilayer filtration. The closed system has resulted in the elimination of a proposed treatment plant for surface water, in a decrease of specific water consumption, and in the recovery of solids. Disadvantages are also discussed, especially corrosion problems. (Ward-IPC)
W77-03818

EFFECT OF RESIDUES FROM EFFLUENT TREATMENT DURING SOLID BOARD MANUFACTURE (AUSWIRKUNG VON RUECKSTANDEN AUS DER ABWASSERREINIGUNG BEI DER VOLLPAPPENERZEUGUNG),
Herzberger Papierfabrik Ludwig Osthushenrich K. G., Herzberg am Harz (West Germany).
G. Windaus, and E. P. Petermann.
Das Papier, Vol. 30, No. 10, p 432-435, October, 1976. 2 fig, 14 ref, 1 tab. English summary.

Descriptors: *Sludge disposal, *Recycling, *Pulp and paper industry, Foreign countries, Europe, Water pollution sources, Wastes, Industrial wastes, Water pollution control, Sludge, Solid wastes, Pulp wastes, Biological treatment.
Identifiers: *Germany, Board mills.

The experiences of two neighboring and equivalent paper mills and the problems encountered in recycling clarification residues from a biological treatment plant are compared. The Herzberg, Germany, plant of Herzberger Papierfabrik Ludwig Osthushenrich KG. put these residues back into production as early as 1963. Based on this company's experiences, similar recycling has been started by the Badische Kartonand Pappenfabrik in Obertsrot. No insurmountable difficulties have arisen, but there has been a 3-4% production loss at Obertsrot, although no such loss occurred at Herzberg. (Ward-IPC)
W77-03819

OPERATING EXPERIENCES WITH AN ELECTROLYTIC METHOD FOR PURIFYING NSSC (NEUTRAL SULFITE SEMICHEMICAL) EFFLUENT (BETRIEBSERFAHRUNGEN MIT EINEM ELEKTROLYTISCHEN VERFAHREN BEI DER REINIGUNG VON NSSC-ABWASSER),
Nettingsdorfer Papierfabrik A. G. (Austria).
J. Fischer.
Das Papier, Vol. 30, No. 10, p 429-432, October, 1976. 1 fig, 2 tab. English summary.

Descriptors: *Pulp wastes, *Waste water treatment, *Flocculation, Electrolytes, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Organic compounds, Costs, Operation and maintenance, Pulp and paper industry, Effluents, Water pollution control, Separation techniques, Electrolysis.
Identifiers: Semichemical pulp mills, Corrugating medium(Fluting paper).

In an integrated pulp and paper mill producing 130,000 metric tons of paper annually, a pulp plant producing 90 tons of neutral sulfite semichemical (NSSC) pulp/day is operated for the subsequent production of corrugating medium. Dissolved organic matter remaining in the pulp after the washers enters the paper machine effluent from the fourdrinier wire. An electrolytic flocculating plant was installed for partial extraction of organic substances from this effluent to reduce the total organic load of the combined effluents after final clarification. The plant designed is described, and the results, costs, and operating experience are reported. A brief review of the principles of electrolytic flocculation is included. (Ward-IPC)
W77-03820

EFFECT OF DYES USED IN THE TEXTILE INDUSTRY ON THE PURIFICATION OF EFFLUENTS BY THE ACTIVATED SLUDGE PROCESS (WPLYW NIEKTORYCH BARWNIKOW STOSOWANYCH W PRZEMYSLE WLOKIENNICZYM NA OCZYSZCZANIE SZIEKOW OSADEM CZYNNYM),
Technical Univ., Lodz (Poland).
M. Lebiedowski, and E. Zelazowska.
Przeglad Wlokienniczy, Vol. 30, No. 9, p 447-449, September, 1976. 4 fig, 7 ref, 2 tab.

Descriptors: *Waste water treatment, *Textiles, *Activated sludge, *Dyes, Wastes, Industrial wastes, Waste treatment, Water purification, Effluents, Toxicity, Biochemical oxygen demand, Water pollution treatment, Water pollution control, Water pollution sources, Microorganisms, Biological treatment, Sorption.

Activated sludge purification experiments were carried out on model effluents containing various dyes and dyeing additives in concentrations usually found in textile industry effluents. The dyes studied included direct dyes, sulfur dyes, vat dyes, disperse dyes, and acid dyes. All dyes had a toxic effect on the activated sludge microorganisms, as evidenced by the slow rate of 5-day BOD reduction. Acid and disperse dyes were the most toxic. Consequently, purification of effluents containing dyes by the activated sludge process should be preceded by sorption of the toxic components. (Stapinski-IPC)
W77-03821

MODERN TECHNIQUE FOR SEDIMENT REMOVAL (MODERN TEKNIK FOR SEDIMENTUPPTAGNING),
Industrikonstruktioner AB., Hassleholm (Sweden).
A. Sandberg.
Svensk Papperstidning, Vol. 79, No. 16, p 523-526, November 10, 1976. 8 fig. English summary.

Descriptors: *Settling basins, *Sludge disposal, Sludge, Treatment facilities, Nozzles, Pumps, Sewage sludge, Water pollution sources, Equipment, Pulp and paper industry, Pulp wastes.

A patented system for removing sediments from settling ponds is described, based on a suction nozzle connected to a submerged pump which traverses the pond suspended by a cable from a telfer. The movement of the nozzle is governed by the sediment profile. A preset path can also be maintained, and the removed slurry concentration can be held constant by adjusting the speed of the suction nozzle. Since no scrapers are used, the condition of the pond bottom is unimportant. (Brown-IPC)
W77-03822

WET OXIDATION OF CLARIFICATION SLUDGE AND PULP EFFLUENT BY THE ZIMPRO PROCESS (NASSOXYDATION VON KLAERSCHLAMM UND ZELLSTOFFABLAUGE MIT DEM ZIMPRO-VERFAHREN),
U. Fenchel, and C. Ulrich.
Wochenblatt fuer Papierfabrikation, Vol. 104, No. 19, p 733-734, October 15, 1976. 1 fig.

Descriptors: *Pulp wastes, *Sludge disposal, Sludge treatment, *Oxidation, Wastes, Industrial wastes, Municipal wastes, Water treatment, Waste water treatment, Water pollution treatment, Water pollution sources, Sludge, Effluents, Pulp and paper industry, Suspended solids.
Identifiers: Deinking sludge, Filler recovery, *Wet oxidation.

The Zimpro (Zimmermann Process) is a wet combustion process which can be used for various purposes, including disposal of municipal sludges, combustion of pulp effluents, clarification sludge treatment, and filler recovery, all of which are discussed. Its use for the treatment of waste paper deinking sludge is mentioned, but not discussed. (Ward-IPC)
W77-03823

BIOLOGICAL EFFLUENT CLARIFICATION IN THE PAPER MILL CIRCULATION SYSTEM (BIOLOGISCHE ABWASSERAUFBEREITUNG IM KREISLAUF EINER PAPIERFABRIK),
B. Morgeli, and J. Gnieser.
Wochenblatt fuer Papierfabrikation, Vol. 104, No. 19, p 731-732, October 15, 1976. 3 fig, 1 illus, 7 ref, 1 tab.

Descriptors: *Activated sludge, *Pulp wastes, *Waste water treatment, Wastes, Industrial wastes, Water pollution treatment, Suspended solids, Control, Biochemical oxygen demand, Pulp and paper industry, Effluents, Waste treatment, Colloids, Water pollution control, Unsteady flow, *Biological treatment, Aeration.
Identifiers: Board mills.

An activated-sludge process with two-stage aeration is described for clarification of paper-mill effluents. Such a process is particularly advantageous for effluents with a relatively high content of colloidal and suspended solids. Experiments in a board mill show that it is possible to compensate for variations in flow and pollution load through an appropriate control system. Likewise, it is possible to preserve the activated sludge over 2-week periods of interrupted incoming effluent flow without observing a significant loss in BOD removal capacity. (Ward-IPC)
W77-03824

EUTROPHICATION AND FISH TOXICITY POTENTIALS IN A MULTIPLE-USE SUBTROPICAL RESERVOIR,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5C.
W77-03825

EQUALIZATION OF FLOW VARIATIONS IN COMBINED SEWERS,
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Water Supply and Sewerage Engineering.
L-E. Janson, S. Bendixen, and A. Harlaut.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol. 102, No. EE6, Proceedings Paper 12596, p 1139-1149, December 1976. 8 fig, 1 tab, 13 ref, 2 append.

Descriptors: *Combined sewers, *Environmental engineering, Flow, Runoff, Storm runoff, Pipe flow, Urban hydrology, Drainage, Water pollution, Hydrology, Storage.
Identifiers: *Flow regulator, Storm water runoff, Overflow runoff, *Flow equalization.

A method was developed for equalizing the flow by using normally unutilized volumes in main sewers and tunnels as temporary storage for excess flow. This was achieved by installation of damming elements and flow regulators at certain points in the network. The basic flow is always discharged through the flow regulator, computed to obtain a favorable use of the storage volume and to maintain a satisfactory self-cleaning of the sewers. At water levels up to the center of the sewer, only this basic flow is discharged, while excess flow is stored upstream from the regulator. Above the center of the sewer, a discharge starts over four triangular outlets in the regulator. At fullflow, the discharge is practically the same as the pipe capacity without a flow regulator. The regulator has no moving parts and requires no electric power. (Lee-ISWS)
W77-03860

ADSORPTION BIOOXIDATION TREATMENT OF WASTE WATERS TO REMOVE CONTAMINANTS THEREFORM,
Ontario Research Foundation, Sheridan Park. (Assignee).
F. Besik.
U. S. Patent No. 3,980,556, 11 p, 4 fig, 6 tab, 8 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 704, September 14, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Water pollution treatment, Water pollution control, Water quality control, *Biological treatment, Activated sludge, Biodegradation, Separation techniques, Recycling, Oxidation.
Identifiers: Sludge regeneration, *Biooxidation.

Suspended and dissolved biodegradable carbonaceous and nitrogenous materials present as contaminants in waste water, typically in raw domestic or municipal sewage, are substantially removed by a one-stage treatment. The waste water is contacted with a mixture of activated carbon and microorganisms, or activated sludge, having molecular oxygen absorbed in it. This results in adsorption and biooxidation of the carbonaceous material, biooxidation of non-nitrate nitrogenous material to nitrate and depletion of the molecular oxygen whereupon biological reduction of the nitrate to nitrogen gases occurs. The nitrogen gases are vented and the resulting treated water is separated from the activated sludge. Regeneration of the activated sludge may be achieved by air stripping, after which the regenerated activated sludge material may be recycled. Further, the treated water may be subjected to clarification to complete the biological reactions and to remove residual suspended solids. The activated sludge from the clarification may be regenerated by air stripping followed by recycle of the regenerated material to the reactor. (Sinha-OEIS)
W77-03865

PHOSPHORUS REMOVAL FROM WASTEWATER,
University Patents, Inc., Stamford, Conn. (Assignee).
I. Yall, N. A. Sinclair, F. A. Roinestad, and C. F. Russ.
U.S. Patent No. 3,980,557, 6 p, 3 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 705, September 14, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Phosphates, Water pollution treatment, Water pollution control, Biological treatment, Microorganisms, *Activated sludge, *Phosphorus.
Identifiers: Acinetobacter phosphadevorus(NRRL B-8058), *Orthophosphates.

This invention provides methods and materials useful in the removal of orthophosphate from wastewater, particularly sewage, through use of activated sludge wastewater treatment systems which have been 'enhanced' in their phosphate removal capacity by the introduction of a cultured growth of the microorganism Acinetobacter phosphadevorus (NRRL B-8058) into ghe sludge in a manner which establishes the organism as an active, sustained-growth biological component. Existing and newly-initiated activated sludge sewage treatment systems may be provided with an enhanced capacity for removal of orthophosphate without further chemial or physical manipulation of the sludge system. (Sinha-OEIS)
W77-03867

DEVICE FOR PURIFYING SEWAGE,
Hitachi Chemical Co., Ltd., Tokyo (Japan). (Assignee).
T. Miyagi, N. Katakai, M. Narita, T. Uchida, and M. Kimura.
U.S. Patent No. 3,980,561, 9 p, 10 fig, 5 tab, 9 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 706, September 14, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water purification, *Water pollution treatment, Biological treatment, Oxygenation, *Activated sludge, Aerobic conditions, Equipment.

A device for purifying sewage employs a bed of aerobes or activated sludge. The device is characterized by the use of a movable air supply which is moved across the bottom portion of the bed to apply a concentrated supply of air to a limited portion of the bed to effect air washing of the bed. The air washing is applied to the entire bed in a predetermined period of time. The device is comprised of a vessel having inlet and outlet ports and is adapted to receive sewage and form a bath of it. A micro-organism carrying bed structure occupies a part of the space in the vessel and leaves a free space which operates as a settling chamber. Air is supplied into the bath in a manner to dissolve oxygen in the sewage and generate a normal circulating flow of sewage which traverses the bed structure downwardly. The air supplied to the bed structure generates an agitating reverse flow of sewage-air mixture which traverses the bed structure in the upward direction. (Sinha-OEIS)
W77-03869

INHIBITION OF SCALE ON SALINE WATER HEAT EXCHANGE SURFACES WITH IMINODIACETIC ACID COMPOUNDS,
Grace (W. R.) and Co., Cambridge, Mass. (Assignee).
For primary bibliographic entry see Field 3A.
W77-03872

METHOD AND APPARATUS FOR ANAEROBIC FERMENTATION,
J. L. Coulthard.
U.S. Patent No. 3,981,803, 10 p, 6 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 950, No 3, p 1133, September 21, 1976.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Water pollution treatment, Water pollution control, Water quality control, *Anaerobic treatment, *Fermentation, Algae, Methane bacteria, Carbon dioxide, Methane, Fertilizers, *Biological treatment.

The invention provides a method for the anaerobic fermentation of organic waste materials in a digestion zone. Algae produced externally of the zone are introduced into the digestion zone. This results in the neutralization of undesirable acidity in the digestion process, thereby preventing or at least minimizing inhibition of the acid sensitive form of methane bacteria and hence increasing gas production. At the same time, the rate of breakdown of fatty acids is increased, as is the nitrogen content of the effluent from the fermentation process. The latter effect may be utilized to advantage by using the effluent as the growth medium for the algae, which also benefits from the controlled acidity of the effluent. In addition, it has been found that by removing a substantial proportion of the carbon dioxide from the gas formed in the fermentation process and recycling it to the ferment, it is possible to increase still further the fermentation efficiency, leading to a gas product of higher methane content and hence higher heating value. Also, the bicarbonate content of the liquid effluent from the fermentation is increased which can also assist in algae photosynthesis. The method yields a combustible gas mixture consisting essentially of methane and provides useful harvests of algae and other by-product materials which may be used in the formation of nitrogenous fertilizers. (Sinha-OEIS)
W77-03873

NATIONAL ECONOMIC MODELS OF INDUSTRIAL WATER USE AND WASTE TREATMENT,
Houston Univ., Tex.
R. G. Thompson, J. A. Calloway, and A. K. Schwartz, Jr.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 57-74. 9 fig, 2 tab, 6 ref.

Descriptors: *Economic efficiency, *Water pollution control, *Industrial water, *Water utilization, *Evaluation, National, Standards, *Fuels, Effects, Water policy, Linear programming, Waste water treatment, Demand, Constraints, Waste treatment, Mathematical models, Systems analysis, Optimization.
Identifiers: *Industrial models, Nonlinear programming, Cost minimization, Waste discharge.

National policy is currently placing increasingly restrictive limitations on discharges of pollutants to the water. The present national goal is to eliminate the discharge of pollutants into navigable waters by 1985. National economic models of the five heavy water-using and fuel-using industries have been developed to show how cost-conscious managers of newly designed plants will respond to major modifications in waste discharge standards, resource availabilities, and resource prices. A new feature of these industrial economic models is that they synthesize the important technical data into a comprehensive economic basis for evaluating the effects of possible policy decisions on the use of resources, the discharge of wastes, and the costs of production before policy decisions are made. Considered are linear programming models which minimize costs. Discussed are structural economic models of important Standard Industrial Classifications developed from combinations of the plant models; these are then combined into a single integrated economic model of the major water-using industries. Plant model results show the effects of higher withdrawal costs and increasingly restrictive wastewater and solid waste discharge standards on resource use. Results of the integrated industry model show the effects of increased crude oil scarcity and increasingly restrictive effluent standards on resource, production, and waste discharges. (See also W77-03924) (Bell-Cornell)
W77-03928

PUBLIC CHOICE AND URBAN WATER QUALITY,
Georgia Univ., Athens.
For primary bibliographic entry see Field 6B.
W77-03960

PHYSICAL AND ECONOMIC PARAMETERS FOR PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Civil Engineering.
S. L. Klemetson, and W. J. Grenney.
Journal of the Water Pollution Control Federation, Vol. 48, No. 12, p 2690-2699, December 1976. 6 fig, 7 tab, 27 ref.

Descriptors: *Waste water treatment, *Regional development, *Alternative planning, *Water pollution control, Mathematical models, Computer models, Evaluation, Operating costs, Standards, Interest rates, Economies of scale, Equations, Systems analysis.
Identifiers: *Model parameters, Unit costs, Cost equations, Indexes, Population.

The use of a mathematical computer model is often the only way to make a preliminary evaluation of a large number of feasible alternatives so that the number required for detailed analysis can be reduced. The development of the parameters necessary for the operation of such a mathematical model is described herein. The application of any model to a waste water treatment system requires that the chosen parameters be valid for real life problems. A number of such parameters is analyzed: population projections; wastewater quantity and quality; stream and effluent standards; pollution removal efficiencies; treatment level classifications; cost indices; interest rates; economies of scale; and cost coefficients for capital and for operation and maintenance costs. Treatment cost equations are developed and described. Through the use of the model, the costs for upgrading waste water treatment plant for a community can be estimated. The data should provide sufficient information for individuals wanting to develop models of waste water treatment systems. (Bell-Cornell)
W77-04010

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
S. Rinaldi, R. Soncini-Sessa, and H. Stehfest.
Research Memorandum, RM - 75 - 77, International Institute for Applied Systems Analysis, Schloss Laxenburg, Austria, December 1975. 29 p, 4 fig, 3 tab, 12 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Linear programming, *Optimization, *Water quality control, River basins, Standards, Investment, Economics, Simulation analysis, Constraints, Algorithms, Equations, Mathematical models, Systems analysis.
Identifiers: *Sequencing, *Branch and bound algorithm, *Integer linear programming, Cost minimization, Oxygen deficit, Pollution index, Additivity property, Rhine River(W. Germany).

If a set of wastewater treatment plants is to be installed in a river basin within a given time period, the optimization problem is to select the best sequence in which the plants should be built. Two sequencing problems of this type are discussed herein, and branch and bound algorithms are proposed for solving them. The first problem is termed primary optimization, minimizing the total cost of the plants that give rise to a tolerable stream quality index. This myopic sequencing utilizes integer linear programming to solve what is referred to as the knapsack problem. Described are the main characteristics of a branch and bound search. The second problem is termed secondary optimization and consists in determining the sequence minimizing the sum of pollution indices over time. Integer linear programming and a branch and bound algorithm are employed here as well. The validity of some simplifying assumptions and the effectiveness of the methods from a computational viewpoint are shown by analyzing the case of the Rhine River in The Federal Republic of Germany. The branch and bound search method is very suitable for solving combinatorial problems by successively examining subsets of the set of solutions until one of the solutions located in one of the subsets is proved to be optimal. (Bell-Cornell)
W77-04019

ON THE COUNTERPLAN FOR TREATMENT OF FOUL WATER WHICH OOZED OUT FROM A DUMPING GROUND, (IN JAPANESE),
Okayama Univ. (Japan). Dept. of Public Hygiene.
T. Okamoto.
Okayama-Igakkai-Zasshi 88(1/2), p 1-7, 1976.

Descriptors: *Waste water treatment, *Leaching, Waste dumps, Garbage dumps, Waste disposal, Water pollution control.
Identifiers: *Japan(Makomo Valley).

The treatment of foul water leached from Makomodani (Makomo valley) of the dump Kurashiki City, Okayama Prefecture, Japan, is described. The most efficient plan is to restrict the garbage heap and provide for rain water drainage to prevent excess water in the dump.--Copyright 1976, Biological Abstracts, Inc.
W77-04066

STUDIES ON THE RECURRENCE OF BACTERIAL FLORA IN DRINKING WATER AFTER OZONIZATION, (IN GERMAN),
Essen Univ. (Gesamthochschule) West Germany). Inst. of Hygiene and Arbitsmed.
For primary bibliographic entry see Field 5F.
W77-04074

STUDY ON THE PURIFICATION OF SEWAGE WATER IN SOILS OF WESTERN SIBERIA, (IN RUSSIAN),
For primary bibliographic entry see Field 5G.
W77-04090

5E. Ultimate Disposal Of Wastes

BPT: CONSIDER THE ALTERNATIVES (BEST PRACTICAL TREATMENT CRITERION).
For primary bibliographic entry see Field 5D.
W77-03690

HYDRAULICS OF SURFACE BUOYANT JET,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
For primary bibliographic entry see Field 8B.
W77-03743

PREPARATION OF FERTILIZERS FROM EFFLUENT SLUDGES OF FERMENTATION PLANTS (POLUCHENIE UDOBRENII IZ SHLAMOVYKH OTKHODOV GIDROLIZNOGO PROIZVODSTVA),
N. V. Glushchenko, M. A. Kuz'mina, V. A. Kuz'min, and R. G. Ivanova.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 5-6, 1976. 3 ref, 1 tab.

Descriptors: *Sludge, *Fertilizers, Water pollution, Wastes, Industrial wastes, Sludge treatment, Sludge disposal, Lignins, Humic acids, Organic compounds, Gypsum, Inorganic compounds, Neutralization, Aeration, Ammonia, Crop production, Crop response, Clovers, Potatoes, Phosphates, Nitrogen compounds, Phosphorus compounds, Potassium compounds, Ultimate disposal, Byproducts, Legumes, Calcium compounds, Sulfates.
Identifiers: *Fermentation plant, Peas, Ammonium sulfate.

During neutralization of hydrolyzates with lime, gypsum precipitates, and during subsequent clarification of the neutralizate, precipitation of finely dispersed lignin and colloidal humic substances occurs. This wastes, called gypsum sludge, consists of 70% gypsum and 30% organic substances. Another type of waste is a mixture of gypsum (about 70%) and insoluble superphosphate (about 30%) obtained when superphosphate and ammonium sulfate are added to the medium, resulting in the formation of diammonium phosphate and gypsum. Finally, when the neutralized and nutrient salt-containing hydrolyzate is aerated, humic substances are oxidized and precipitate. This waste consists of 97% organic substances. All three types of waste also contain nitrogen, potassium, and phosphorus compounds, as well as microelements. These waste materials can be converted into fertilizer by neutralization with ammonia to pH 6-8, thickening, and drying. Potatoes, clover, and peas treated with this fertilizer showed crop yield increases of 15-20%. (Stapinski-IPC)
W77-03810

USE OF EFFLUENTS FROM FERMENTATION PLANTS FOR FIELD IRRIGATION (ISPOL'ZOVANIE STOCHNYKH VOD GIDROLIZNYKH ZAVODOV DLYA OROSHENIYA POLEI),
For primary bibliographic entry see Field 5D.
W77-03814

POSSIBLE USES FOR FIBROUS SLUDGES FROM THE PULP AND PAPER INDUSTRY,
L. Soderhjelm.
Paperi ja Puu, Vol. 58, No. 9, p 620-622, 625-626, 629, September, 1976. 6 fig, 11 ref, 7 tab.

Descriptors: *Sludge, *Pulp wastes, Pulp and paper industry, Wastes, Industrial wastes, Foreign countries, Europe, Costs, Disposal, Sludge disposal, Ultimate disposal, Feeds, Silage, Soil amendments, Construction materials, Fermentation, Incineration, Fuels, Oxidation, Clays, Water pollution sources, Water pollution control, Carbohydrates, Byproducts.
Identifiers: *Finland, Xylitol Sugar alcohols.

In Finland, the generation of fibrous sludge from treated pulp and paper mill effluents (white water) amounts to about 180,000 oven-dry tons/year, which would cost about $2,000,000 for land disposal. A major proportion can be or could be recirculated and reused in paper, board, and fiber insulation boards. However, some sludge types are not suitable for recycling. Conversion into animal fodder (silage supplement) and/or soil amendments seems to be an advantageous outlet for low-ash sludges, whereas high-ash sludges may find better use in the building industry, e.g., in bricks, cement tiles, and plastic fillers (to replace wood flour). Additional possibilities include fermentation (of birch- or other hardwood-derived sludge fibers) into xylitol, other enzymic conversions, oxidation for clay recovery, and incineration as fuel. (Brown-IPC)
W77-03817

EFFECT OF RESIDUES FROM EFFLUENT TREATMENT DURING SOLID BOARD MANUFACTURE (AUSWIRKUNG VON RUECKSTANDEN AUS DER ABWASSERREINIGUNG BEI DER VOLLPAPPENERZEUGUNG),
Herzberger Papierfabrik Ludwig Osthushenrich K. G., Herzberg am Harz (West Germany).
For primary bibliographic entry see Field 5D.
W77-03819

MODERN TECHNIQUE FOR SEDIMENT REMOVAL (MODERN TEKNIK FOR SEDIMENTUPPTAGNING),
Industrikonstruktioner AB., Hassleholm (Sweden).
For primary bibliographic entry see Field 5D.
W77-03822

WET OXIDATION OF CLARIFICATION SLUDGE AND PULP EFFLUENT BY THE ZIMPRO PROCESS (NASSOXYDATION VON KLAERSCHLAMM UND ZELLSTOFFABLAUGE MIT DEM ZIMPRO-VERFAHREN),
For primary bibliographic entry see Field 5D.
W77-03823

EUTROPHICATION AND FISH TOXICITY POTENTIALS IN A MULTIPLE-USE SUBTROPICAL RESERVOIR,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5C.
W77-03825

MIXING OF SUBMERGED TWO-DIMENSIONAL BUOYANT JETS IN UNIFORM BODIES OF WATER IN THE ABSENCE AND PRESENCE OF WIND ACTION,
California Univ., Berkeley. Div. of Hydraulic and Sanitary Engineering.
For primary bibliographic entry see Field 8B.
W77-03828

METHOD OF DISPOSING SLUDGES CONTAINING SOLUBLE TOXIC MATERIALS,
Browning-Ferris Industries, Inc., Houston, Tex. (Assignee).
S. R. Thompson.
U.S. Patent No. 3,980,558, 4 p, 3 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 705, September 14, 1976.

Descriptors: *Patents, *Waste disposal, *Ultimate disposal, Water pollution sources, Waste storage, Waste treatment, Industrial wastes, Toxicity, Toxins, Water pollution, Cements, *Sludge disposal.

The invention is a process for permanently disposing of liquid or semi-liquid wastes containing soluble toxic materials to prevent leaching of these toxic materials into the surrounding environment. It is comprised of admixing the liquid or semi-liquid wastes and a solidifying agent consisting essentially of a hydraulic cement in an amount sufficient to provide a fluid mass which will set upon standing to a contiguous rock-like solid consistency. The contiguous rock-like solid is insoluble in water and the soluble toxic materials are entrapped and prevented from leaching into the surrounding environment. It has been found that the liquid or semi-liquid wastes must be admixed with the hydraulic cement in an amount of at least about 9 lbs cement per gallon of waste containing from about 30 to 40% solids to provide a mixture which will be sufficiently fluid yet will set to a rock-like solid consistency of sufficient strength and non-porosity to entrap the soluble toxic materials to prevent leaching. The process includes pouring the mixture of semi-liquid waste and binding agent into a subsurface soil pit lined with a moisture impervious film prior to setting and then covering the solidified mass with a layer of soil. (Sinha-OEIS)
W77-03866

HYDROLOGY OF THE SOLID WASTE BURIAL GROUND, AS RELATED TO THE POTENTIAL MIGRATION OF RADIONUCLIDES, IDAHO NATIONAL ENGINEERING LABORATORY,
Geological Survey, Boise, Idaho. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03874

COASTAL MARINE POLLUTION AND FISH,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5C.
W77-03902

CONSTRUCTION IN THE COASTAL ZONE: A POTENTIAL USE OF WASTE MATERIALS,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 6G.
W77-03916

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 1ST QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 2ND QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 3RD QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03919

THE APPLICATION OF BOREHOLE GEOPHYSICS TO THE SELECTION AND MONITORING OF NUCLEAR WASTE DISPOSAL SITES,
Geological Survey, Lakewood, Colo. Water Resources Div.
D. E. Eggers.
Reprint from Proceedings of 17th U.S. Symposium on Rock Mechanics, held at Snowbird, Utah, August 25-27, 1976: U.S. National Committee for Rock Mechanics of the National Academy of Sciences, National Research Council, p 4B-1 - 4B-3-7, 1976. 5 fig, 1 tab, 13 ref.

Descriptors: *Waste disposal wells, *Nuclear wastes, *Borehole geophysics, *Borehole cameras, *Aquifer characteristics, Water pollution control, Groundwater, Path of pollutants, Injection wells.
Identifiers: *Waste disposal site selection.

The borehole televiewer is used for identifying fracture porosity that can have crucial bearing on the patterns of ground-water flow and, consequently, the migration of radionuclides associated with radioactive wastes. Borehole gamma spectrometry is used to identify and determine the concentration levels of artificial gamma-emitting radionuclides moving in the ground-water system. The artificial radioisotopes Co-60, Cs-134, and Cs-137 have been detected in a monitoring research program conducted at some of the existing commercially and federally operated solid low-level radioactive waste-burial sites. Concentration levels as great as several tons of picocuries per gram have been measured. The detection limits of the borehole gamma-spectrometry system now in use are of the order of 0.1 picocuries per gram. (Woodard-USGS)
W77-03970

GROUND-WATER POLLUTION NEAR A LANDFILL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W77-03991

5F. Water Treatment and Quality Alteration

THE USE OF MACRORETICULAR POLYMERIC ADSORBENTS FOR THE TREATMENT OF WASTE EFFLUENTS,
Rohm and Haas Co., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W77-03605

HYGIENIC ASSESSMENT OF THE DESTRUCTION PRODUCTS OF SURFACTANTS IN WATER OZONIZATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (I) (USSR). Dept. of Public Hygiene.
For primary bibliographic entry see Field 5D.
W77-03772

IDENTIFICATION OF 1,1,1-TRICHLOROACETONE (1,1,1-TRICHLOROPROPANONE) IN TWO DRINKING WATERS: A KNOWN PRECURSOR IN HALOFORM REACTION,
Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W77-03794

INTERNAL TREATMENTS FOR BOILERS OPERATING ABOVE 1200 PSI,
Nalco Chemical Co., Oak Brook, Ill.
For primary bibliographic entry see Field 8G.
W77-03803

REDUCTION OF DEPOSIT FORMATION IN HEAT EXCHANGERS (SNIZHENIE OSADKOOBRAZOVANIYA V TEPLOOBMENNOI APPARATURE),
For primary bibliographic entry see Field 8G.
W77-03808

TESTS OF COAST GUARD DEVELOPED HIGH SEAS OIL RECOVERY SYSTEMS AT EPA OHMSETT,
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-03905

STUDIES ON THE RECURRENCE OF BACTERIAL FLORA IN DRINKING WATER AFTER OZONIZATION, (IN GERMAN),
Essen Univ. (Gesamthochschule) West Germany). Inst. of Hygiene and Arbitsmed.
K. Stalder, and W. Klosterkoetter.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(5/6), p 474-481, 1976.

Descriptors: *Bacteria, *Potable water, Aquatic plants, Nutrients, Disinfection, *Ozone, Organic matter, Water treatment, Waste water treatment.
Identifiers: *Ozonization.

The use of O3 as a drinking water disinfectant is increasing. As opposed to the commonly used Cl the disinfecting activity of O3 cannot be sustained in the water during the distribution process, and as a result recontamination and bacterial growth are not adequately under control. Information about the safety margins of this disinfecting procedure was obtained in experiments simulating the working conditions of a water plant including supply system. After treatment with 1.5 mg O3/l water, specimens with no detectable residual O3 remained sterile for at least 1 mo. During the passage of a pipeline of 1200 m length recontamination with and considerable growth of microorganisms was observed. After inoculating water sterilized by O3 with a normal population of water bacteria, the bacterial growth was more

pronounced than in similar experiments with heat-sterilized water of the same origin. This may be an indication that the breakdown products of organic water contaminants (e.g., humic acid) resulting from the O3 treatment are better nutrients for the water bacteria than the original organic substances themselves.--Biological Abstracts, Inc.
W77-04074

WATER DISINFECTION BY MEANS OF CHLORINE: KILLING OF AGGREGATE BACTERIA, (IN GERMAN),
Erlangen-Nuremberg Univ. (West Germany). Hygiene Inst.
S. Carlson, U. Haesselbarth, and R. Langer.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med 161(3), p 233-247, 1975.

Descriptors: *Chlorine, *Bacteria, *Disinfection, Algae, E. coli, Salmonella, *Water treatment.
Identifiers: *Aggregate bacteria, Flocculants, *Salmonella-Anatum.

Rising water demands ask for an increasing utilization of more or less contaminated surface water that has to be chlorinated prior to treatment. Especially during periods of lake bloom, the desired disinfecting effect is not achieved in spite of high concentrations of Cl present. This is due to a coating of bacterial surfaces by substances such as algal products having a protective effect as demonstrated in experimental studies. Bacteria in a central position within bacterial aggregates as formed by the addition of flocculants in the process of water treatment, are also protected against the action of Cl. In cases of inadequate filter backwashing, such aggregates may penetrate into clean water. Accumulations of bacteria in the shape of widespread growth may also form on activated C filters, ion exchangers, at walls of tanks under unfavorable hydraulic conditions and in stagnant parts of supply pipes. Curves depicting the kill of Escherichia coli differentiated by O-agglutination and Salmonella anatum were exhibiting longer survival periods as compared with non-aggregate bacteria. For organisms differentiated by H-agglutination, kill was between these values. The killing rate was a function of the oxidation-reduction potential. Survival times of E. coli and S. anatum were different. Cl concentrations common in the practice of water works frequently do not suffice to kill bacteria within aggregates and a colony count does not permit conclusions as to the bacterial count if bacterial aggregates are present.--Biological Abstracts, Inc.
W77-04075

BDELOVIBRIO BACTERIOVORUS AS A FACTOR OF THE SELF-PURIFICATION OF RIVER WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Pushchino. Inst. of Biochemistry and Physiology of Microorganisms.
For primary bibliographic entry see Field 5G.
W77-04095

5G. Water Quality Control

IN-PLANT, OUTSIDE POLLUTION EVILS, ENERGY SAVING TOP AATCC CONCERNS.
Textile World, Vol. 126, No. 11, p 108, 111, 113, 115, 116, 118, 121, November, 1976.

Descriptors: *Textiles, *Industrial wastes, *Water pollution control, *Biochemical oxygen demand, *Dyes, Waste water treatment, Recycling, Biological treatment, Lime, Ozone, Color, Recycling, Activated carbon, Energy.

Several aspects of pollution and energy savings concerns in the textile industry were discussed. The problem of substances used in the permanent press processing of cotton which could produce carcinogens was investigated. A major concern was the correction of water pollution caused by effluent from textile works. Tests were conducted on dye bath, scour and rinse waters from the dyeing process. In several cases, high BOD, TOC, or ammonia nitrogen were explained by known additions to the dye bath. BOD was highly reduced by biological treatment, but TOC reduction was not as great, suggesting the presence of materials which were not readily biodegradable. Biological treatment was not successful at color removal, but a treatment which combines alum and powdered activated carbon was quite effective. Lime was an effective treatment for waste water containing calcium carbonate-forming levels of carbonate alkalinity. Reactive and basic dye colored water was successfully treated with ozone, but it could not adequately decolorize waste water colored by disperse dyes. 1,2,4-Trichlorobenzene, a dye carrier, is biodegradable and 65% or more of it can be removed in a well-aerated basin. For small plants a fixed bed adsorber system with no on-site regeneration system was suggested. Larger plants were urged to incorporate a pulsed bed system with an on-site regeneration system for recycling spent carbon. Combined activated carbon and biological treatment systems are being tested. Solar energy and energy recycling were two suggestions for providing energy savings. (Collins-FIRL)
W77-03620

LOSSES OF DIURON, LINURON, FENAC, AND TRIFLURALIN IN SURFACE DRAINAGE WATER,
Agricultural Research Service, Baton Rouge, La.
G. H. Willis, R. L. Rogers, and E. M. Southwick.
Journal of Environmental Quality, Vol 4, No 3, 1975. p 399-402, 5 tab, 27 ref.

Descriptors: *Return flow, Runoff, *Herbicides, Water pollution, Water quality, Pollution, Aquatic environment, Aquatic life, *Drainage water, Mississippi River basin.
Identifiers: *Diuron, *Linuron, *Fenac, *Trifluralin, *Mississippi River Valley.

Diuron, linuron, fenac, and trifluralin were applied to plots designed for sampling surface runoff. Over a 3-year period, highest concentrations in runoff were usually associated with rainstorms that occurred soon after application. Maximum seasonal losses were less than 0.12, 0.30, 2.90, and 0.05% of the applied diuron, linuron, fenac, and trifluralin, respectively. The data suggest that with proper use on agricultural land in the lower Mississippi River Valley these herbicides pose little threat to adjacent aquatic areas. (Skogerboe-Colo St)
W77-03639

WATER POLLUTION CONTROL ADMINISTRATION, A MEMORANDUM REPORT ON A RECONNAISSANCE STUDY.
Public Administrative Service, Chicago, Ill.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 752, Price codes: A02 in paper copy, A01 in microfiche. Prepared for HEW, Public Health Service, April 1963, 18 p.

Descriptors: *Water pollution control, *Water quality control, *Administration, *Water pollution, *Management, Governments, Decision making, Coordination, Planning, Water management(Applied), Water policy, Water resources development, Water conservation, Federal jurisdiction, Federal government, State jurisdiction, State governments, Local governments.

According to a reconnaissance survey conducted by the Public Administration Service, the present approach in water pollution control administration is inadequate because of insufficient money and effort and because of poor administration. The numerous governmental agencies involved in water pollution control administration further complicate efficient organization and operation. Although ultimate authority lies with state governments over water within their boundaries, federal standards and financing can not be ignored. The report examines state administration, state-local relations, state-federal relations, and industrial involvement. The report recommends more efficient state administration with clear-cut programs and objectives that can be coordinated with the national effort in order to arrive at a coordinated and efficient level of administration. The report also emphasizes the need for an effective enforcement program to help implement the water pollution control plans. (Welch-Florida)
W77-03684

CALIFORNIA WATER LAW IN PERSPECTIVE,
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 6E.
W77-03689

LEGAL PROTECTION FOR FLORIDA WETLANDS,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03696

ENVIRONMENTAL PROTECTION IN MEXICO AND CANADA,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03698

CONTINGENCY PLAN FOR SPILLS OF OIL AND HAZARDOUS MATERIALS FOR INLAND WATERS OF REGION III.
Environmental Protection Agency, Philadelphia, Pa. Region III.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 959, Price codes: A11 in paper copy, A01 in microfiche. Report EPA 903/9-73-007, December 1973. 247 p, 17 map.

Descriptors: *Oil spills, *Water pollution treatment, *Federal government, *Inter-agency cooperation, Coordination, Delaware, Virginia, West Virginia, Maryland, Pennsylvania, Planning, Disasters, Water pollution sources, Water pollution, Oil pollution, Cleaning.
Identifiers: *Oil Pollution Act, *Administrative regulations.

A coordinated response from all concerned federal agencies to minimize hazards from the discharge of oil or other substances is outlined in this plan. It provides for assignment of duties, establishment of task forces, structure of reporting systems, establishment of operations centers, schedules of chemical treatments, enforcement procedures, press guidelines, and on-scene coordination. Beginning with the assumption that federal agencies should start to take all actions and responsibilities delegated to each agency, the report proceeds to develop national and regional activities, both permanent and contingency oriented. The plan annexes contain a detailed guide to actual performance for the states of Pennsylvania, Maryland, Virginia, West Virginia, and Delaware. Information and phone numbers are provided for military commands, agencies, cleanup contractors, sources of hay, pumps, waste-oil dealers, aircraft, spray planes, floodlights, vacuum trucks, weather forecasters, local aid groups, barges, skimmers, and boats. Data is also provided on chemical and physical properties of spills, funding for clean-ups, coordination with state agencies, legal guidelines, and how to handle publicity. (Molloy-Florida)
W77-03700

FRYINGPAN--ARKANSAS PROJECT COLORADO, FINAL ENVIRONMENTAL STATEMENT,
Bureau of Reclamation, Washington, D. C
For primary bibliographic entry see Field 8A.
W77-03702

STATE ADMINISTRATION GENERALLY (POWERS AND DUTIES OF THE DEPARTMENT OF WATER RESOURCES).
For primary bibliographic entry see Field 6E.
W77-03704

KLAMATH RIVER BASIN COMPACT.
For primary bibliographic entry see Field 6E.
W77-03705

DAMAGES COMPENSABLE UNDER FEDERAL MARITIME LAW FOR INJURIES CAUSED BY DISCHARGE OF OIL INTO NAVIGABLE WATERS,
J. F. Rydstrom.
26 ALR Fed 346-58 (1976). 13 p.

Descriptors: *Navigable waters, *Penalties(Legal), *Oil spills, *Damages, Fishing, Sport fishing, Commercial fishing, Fish, Aquatic life, Water pollution sources, Oil pollution, Oil wastes, Water pollution, Oil industry, Oily water, Federal government, State governments, Governmental interrelations, Legal aspects, Social aspects, Judicial decisions, Water law, Water quality, Legislation, Beaches, Ships.
Identifiers: *Water Quality Improvement Act of 1970, *Water Pollution Control Act of 1972, Nuisance(Legal aspects), Proximate causation, Navigation obstructions.

The Federal Water Pollution Control Act of 1972 does not take cognizance of illegal oil discharge damage claims except to the extent of the costs of the Federal Government if it does the cleaning up. Thus states are left free to impose liability in damages for losses suffered by both the states themselves and private interests. The courts in several cases have recognized compensable rights in pollution-free navigable waters. States have been allowed to recover damages for the cost of clean up and also as parens patriae for damage done to aquatic life. Private parties also may recover damages for destruction of marine life due to oil spills where they can show an injury different in kind from the public in general. Usually, commercial fishermen will be granted relief while the weekend fisherman will not. Injury to both public and private vessels caused by the discharge of oil into navigable waters is compensable. Proprietors of beach houses and operators of beach activities on navigable waters have been allowed recovery for damages provided they meet the 'different in kind' test. The loss of the use of a private pleasure boat is not compensable when a discharge of oil merely deprives its owner temporarily. (Moorhouse-Florida)
W77-03711

BOYER V DEPT OF HEALTH (LOCATION OF LEACH FIELD RELATIVE TO WATER SUPPLY).
For primary bibliographic entry see Field 6E.
W77-03713

CLEAR LAKE APARTMENTS, INC V CLEAR LAKE UTILITIES (EXCLUSIVE RIGHT TO PROVIDE WATER NOT A COVENANT RUNNING WITH THE LAND).
For primary bibliographic entry see Field 6E.
W77-03716

PROTECTION OF WATER SUPPLY.
For primary bibliographic entry see Field 6E.
W77-03719

MARINE SANITATION.
For primary bibliographic entry see Field 6E.
W77-03720

DELETERIOUS SUBSTANCES IN STREAMS.
For primary bibliographic entry see Field 6E.
W77-03721

WATER AND SEWAGE.
For primary bibliographic entry see Field 6E.
W77-03724

THE POTENTIAL FOR NUCLEAR AND GEOTHERMAL POWER PLANT SITING IN IDAHO AS RELATED TO WATER RESOURCES,
Idaho University, Moscow, Dept of Civil Engineering.
For primary bibliographic entry see Field 3E.
W77-03730

CURRENTS AND POLLUTANT DISPERSION IN LAKE MICHIGAN, MODELED WITH EMPHASIS ON THE CALUMET REGION,
Illinois Univ. at Chicago Circle. Dept. of Information Engineering.
For primary bibliographic entry see Field 5B.
W77-03732

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS FOR THE COPPER, NICKEL, CHROMIUM, AND ZINC SEGMENT OF THE ELECTROPLATING POINT SOURCE CATEGORY,
Environmental Protection Agency, Washington, D. C. Effluent Guidelines Div.
K. R. Krickenberger.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-238 834, Price codes: E03 in paper copy, A01 in microfiche. Report No. EPA-440/1-74-003-a, March 1974. 68-01-0592.

Descriptors: *Industrial wastes, *Chemical wastes, *Metal, *Water pollution sources, *Water quality standards, Industrial plants, Industries, Electrochemistry, Acids, Toxins, Copper, Nickel, Chromium, Zinc, Industrial production, Waste water(Pollution), Effluents, Standards.
Identifiers: *Electroplating industry, *Point source pollution, Rack and barrel electroplating, Cyanide, Effluent limitations guidelines.

Industrial activities relating to rack and barrel electroplating of copper, nickel, chromium and zinc constitue a single subcategory of point source pollution for effluent limitations guidelines purposes. Considerations of such factors as plant age, production process, geographic location, wastes generated, wastewater treatment, and control techniques, all support this conclusion. This segment contributes about two-thirds of the chemicals added to wastewater in the electroplating industry. Sufficient data was available for 53 operating plants, showing that 13 of them achieve concentrations of pollutants and water use estimates upon which the guidelines are based in the treated effluent using conventional chemical treatment system. Of these 13 plants, 11 are captive and two are job-shops. Verification testing on four plants shows that two of them--one a captive and the other a job shop--are meeting the guidelines. Guidelines are delineated for degree of effluent reduction attainable through application of the 'Best Practicable Control Technology Currently Available' and the 'Best Available Technology Economically Feasible' and new source performance standards are given for the degree of effluent reduction achievable through use of the best available demonstrated control technology, processes, operating methods or other alternatives. (Harris-Wisconsin).
W77-03775

WATER POLLUTION INVESTIGATION: DETROIT AND ST. CLAIR RIVERS.
Environmental Control Technology Corp., Ann Arbor, Mich.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-242 604, Price codes: A16 in paper copy, A01 in microfiche. Report No. EPA-905/9-74-013, December 1974. 364 p. 88 fig., 31 tab., 67 ref., 4 append. EPA 68-01-1570.

Descriptors: *Rivers, *Pollution abatement, *Lake Erie, *Surveys, *Water quality, Water pollution control, Water quality standards, Mathematical models, Biological communities, Chemical properties, Benthos, Phytoplankton, Pollutants, Pesticides, Heavy metals, Eutrophication, Monitoring, Sewage effluents, Chlorides, Phenol, Cliforms, Nutrients, Trace elements, Bottom sediments, Projections, *Michigan, Iron, Varieties, Chlorophyll, Ammonia, Phosphorus, Great Lakes.
Identifiers: *St. Clair River(Mich), *Detroit River(Mich), Effluent limitations, Lake St. Clair.

The St. Clair and Detroit Rivers near Detroit, Michigan, were surveyed to evaluate effects of effluent limitations on the water quality of the rivers, of Lake Erie and the Great Lakes. Survey results were compared to historical records with indications that pollution abatement programs instituted during the last decade have enhanced water quality in the region. Parameters measured included: chloride, coliforms, biochemical oxygen demand, and chemical oxygen demand; cadmium, chromium, copper, lead, mercury, nickel, zinc, manganese, iron and their sediment exchange; and nitrogen compounds and phosphorus. Biological sampling, including benthos, was related to species diversity, dominant organisms, and chlorophylla. A steady state mathematical model was developed for the Detroit River, incorporating a three-dimensional system; it is capable of simulating first order reaction kinetics and a coupled system, such as BOD-DO. Its function is to allow a definition of waste inputs as well as projections of water quality based on higher degrees of wastewater treatment and alternative management plans. Current water quality standards and/or goals are presently met, with occasional exceptions of phenol and mercury in the St. Clair River, and with respect to total coliforms, phenol and mercury in the Detroit River. The model projects that present effluent limitations will meet the goal of 2 microgram/l average phenol concentration in 1977. (Auen-Wisconsin)
W77-03783

ELEMENTS OF QUALITY ASSURANCE IN ENVIRONMENTAL SURVEILLANCE,
Los Alamos Scientific Lab., N. Mex. Environmental Studies Group.
For primary bibliographic entry see Field 7A.
W77-03786

A SCHEME FOR EFFECTIVE CONTROL OF EFFLUENT PH,
Celanese Chemical Co., Bishop, Tex.
For primary bibliographic entry see Field 5D.
W77-03802

WATER TREATMENT FOR BOILER OPERATING PRESSURES ABOVE 1200 PSIG,
Ecodyne Corp., Union, N. J. Graver Water Div.
For primary bibliographic entry see Field 3E.
W77-03805

A SURVEY OF PULP AND PAPER INDUSTRY ENVIRONMENTAL PROTECTION EXPENDITURES AND OPERATING COSTS - 1975,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W77-03807

GREAT LAKES (PAPER CO.) PIONEERS TOMORROW'S TECHNOLOGY,
For primary bibliographic entry see Field 5D.
W77-03809

WATER PROBLEMS IN THE COLORADO RIVER BASIN: LEGAL AND INSTITUTIONAL FRAMEWORK,
Economic Research Service, Washington, D.C.
J. Chrisman, Jr., J. H. Snyder, and C. V. Moore.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 033, Price codes: A05 in paper copy, A01 in microfiche. Working paper, Number 2, NRE Economic Research Service, U.S. Dept. of Agriculture, April 1976. 70 p, 3 fig, 15 tab. (California Water Resources Center Project UCAL-WRC-W-244).

Descriptors: *Water quality, *Management, *Interstate, Federal-state water rights conflicts, Legal aspects, Ordinances, *Colorado River basin, California, Arizona, Legal aspects, *Institutions, Water rights, International waters.
Identifiers: Colorado River(Calif-Ariz).

A comprehensive review is presented of state, interstate, and international arrangements, agreements, contracts and legal decisions that have governed or now dictate management of the waters in the Colorado River. Emphasis is placed on legal and institutional arrangements as they relate to water quality management problems. Implications of recent decisions governing construction of a desalting plant are included. (California, Davis)
W77-03830

STANDARD 'POTABLE WATER' (ALL-UNION STATE STANDARD 2874-73, A NEW STAGE IN THE DEVELOPMENT OF WATER HYGIENE, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
Y. V. Novikov.
Vestn Akad Med Nauk SSR 3, p 59-64, 1975.

Descriptors: *Potable water, *Water quality standards, E. coli, Fluorine, *Public health, Toxicity, Sulfates, Phosphates, Radioisotopes, Ions, Sodium, Strontium radioisotopes.
Identifiers: Radon-226, Selenium, Silver, Strontium-90, Uranium, *USSR.

During development of a potable water standard, the concept of summation of similar effects produced by minor concentrations of substances contained in water was formulated. In accordance with the new standard a calculating formula which takes into account the combined effect of various substances according to their toxicological characteristics is given. (Escherichia coli, polyacrylamide, Se, F, U, 226Ra, 90Sr, Ag ions, sulfates and Na hexametaphosphate are mentioned.)
W77-03853

METHOD AND AN APPARATUS FOR COLLECTING SUBSTANCES AND OBJECTS ON A LIQUID SURFACE,
E. S. Netzell.
U. S. Patent No. 3,980,559, 12 p, 6 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 705, September 14, 1976.

Descriptors: *Patents, *Oil spills, *Oily water, *Oil pollution, Water pollution treatment, *Water pollution control, Water quality control, *Separation techniques, Equipment pontoons, *Pollution abatement.
Identifiers: Conveyor belts.

The apparatus for collecting oil on a water surface is comprised of two parallel pontoons positioned beside each other. A basin is formed between these pontoons by the opposite pontoon side walls and a bottom plate. When the craft arrives at an area where the water surface is polluted, the plates in front of the basin are adjusted in such a way that the front edge of the leading plate is positioned at an appropriate distance under the water surface. This distance is choosen from case to case depending on the substances and objects floating on the surface. Then, the slope of the plates is adjusted in such a way that, when the craft moves through the water, the upper layer of the water and the substances and objects floating in this layer flow up on the plates and over the upper edge of the plates and further out on the distributing surface, where the polluted water is distributed and spread out. From the distributing surface the water and the carried substances flow either through holes in the distributing surface or over the edges onto the collecting area which constitutes a large portion of a conveyor belt. The substances are collected by the conveyor belt or by a protecting layer resting on the conveyor belt and transported to the collecting receptacle. The water which flows through the conveyor belt is drained off through the pumps arranged at the rear wall of the basin. (Sinha-OEIS)
W77-03868

COMPOSITION FOR REMOVAL OF IMMISCIBLE FLUIDS FROM WATER SURFACES AND LAKE BEDS,
Electrolysis Pollution Control Inc., Minneapolis, Minn. (Assignee).
E. C. Peterson.
U.S. Patent No. 3,980,566, 4 p, 8 ref; Official Gazette of the United States Patent Office, Vol 950, No 2, p 707, September 14, 1976.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution treatment, *Water pollution control, Water quality control, *Separation techniques, Adsorption, *Pollution abatement.
Identifiers: Lead slag mineral wool, Natural stone.

A method of removing immiscible fluids such as oil spills from the surface of bodies of water comprises placing an adsorbant compound on the water surface in contact with the immiscible fluid and maintaining contact between the surface of the immiscible fluid and the adsorbant material until the immiscible fluid is adsorbed. The adsorbant compound consists of an admixture comprising from between about 30% and 70% by weight of lead slag mineral wool, with the balance being a finely divided natural stone substance containing substantial quanties of iron, aluminum, and magnesium oxides, including such natural stones as trap rock, basalt and gabbro. The lead slag mineral wool is treated with a hydrophobic-oil-soluble hydrocarbon chain substance, such as oleic acid to wet the surface of the mineral wool prior to mixing with stone flour. The lead slag mineral wool is preferably fragmented into nodules having a diameter of 1/2 to 1 inch. The composition may be also utilized for removing oil spills from lake beds or soil surfaces. The composition of the adsorbant compound does not contribute to biological oxygen demand in the water being treated. The substances are highly inert, and are utilized for their highly adsorbant characteristics. The rate of adsorption is high, and retention of adsorbed oily materials has also been found to be unusually high. An oil slick may be removed from the surface of a body of water by broadcasting the adsorbant compound upon the surface of the water. (Sinha-OEIS)
W77-03870

WASTE-ASSIMILATION STUDY OF KOSHKONONG CREEK BELOW SEWAGE-TREATMENT PLANT AT SUN PRAIRIE, WISCONSIN,
Geological Survey, Madison, Wis. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03876

ABATEMENT OF NITRATE POLLUTION IN A PUBLIC-SUPPLY WELL BY ANALYSIS OF HYDROLOGIC CHARACTERISTICS,
Geological Survey, Laguna Niguel, Calif.
L. A. Eccles, J. M. Klein, and W. F. Hardt.
Ground Water, Vol 14, No 6, p 449-454, November-December 1976. 6 fig, 3 ref.

Descriptors: *Water pollution sources, *Path of pollutants, *Nitrates, *Groundwater, *California, Fertilizers, Citrus fruits, Water analysis, Sampling, Pumping, Water yield, Water pollution control, Methodology.
Identifiers: *Redlands(Calif).

High concentrations of dissolved nitrate in the ground water in the Redlands, California, vicinity threaten public water supplies. Dissolved nitrate-nitrogen concentrations in water from wells, which frequently exceed 10 mg/liter, are attributed to the previous applications of large quantities of commercial nitrogen fertilizer on citrus crops. In a city of Redlands public water-supply well field, wells 1 and 2 normally produce water with dissolved nitrate-nitrogen concentrations of about 18 and 30 mg/liter respectively. Well 1 is a large-capacity well capable of yielding 3,700 gal/min and is the major source of water in the well field. Chemical analyses of water collected from well 1 during the first 48-hour test showed an increase in dissolved nitrate-nitrogen from 4.1 mg/liter to a maximum of almost 20 mg/liter. Dissolved nitrate-nitrogen concentrations during the 48-hour test of well 2 stayed constant at 30 mg/liter. Interpretation of the studies indicate that the upper zone of saturation is higher in concentration of dissolved nitrate. To reduce the concentration of dissolved nitrate in water from well 1, an inflatable packer was placed in the casing at 480 feet to coincide with the bottom of the clayey interval. The packer sealed off the upper part of the well and reduced dissolved nitrate-nitrogen concentrations from 20 to 4 mg/liter while only reducing well yield from 3,700 to 2,600 gal/min. (Woodard-USGS)
W77-03879

AN EVALUATION OF SURFACE-MINE SPOILS AREA RESTORATION IN WYOMING USING RAINFALL SIMULATION,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5B.
W77-03892

THE EFFECTS OF FRESHWATER INFLOWS ON HYDROLOGICAL AND BIOLOGICAL PARAMETERS IN THE SAN ANTONIO BAY SYSTEM, TEXAS,
Texas Parks and Wildlife Dept., Austin. Coastal Fisheries Branch.
For primary bibliographic entry see Field 2L.
W77-03897

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT. SPECIAL REPORT I: WATER QUALITY MODELLING AND MANAGEMENT STUDIES FOR CORPUS CHRISTI BAY: A LARGE SYSTEM APPROACH,
Texas Univ., at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 5B.
W77-03898

A ZERO-RELATIVE-VELOCITY BELT SKIMMER,
Shell Development Co., Houston, Tex. Pipeine Research and Development Lab.
For primary bibliographic entry see Field 5C.
W77-03899

CHEMICAL HAZARDS RESPONSE INFORMATION SYSTEM FOR MULTIMODAL AC-

CIDENTS (CHRISMA) (A REEVALUATION OF CHRIS FOR ALL MODES OF TRANSPORTATION),
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W77-03903

DEVELOPMENT OF FAST CURRENT OIL RESPONSE SYSTEM,
Science Applications, Inc., McLean, Va.
N. P. Trentacoste.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 496, Price codes: A09 in paper copy, A01 in microfiche. U.S. Coast Guard Office of Research and Development Report No. CG-D-34-75, March 1975. 95 p, 13 tab, 6 ref. DOT-CG-40216-A.

Descriptors: *Oil spills, *Oil pollution, *Water pollution control, *Pollution abatement, *Water resources, Hydrofoils, Separation techniques, Model studies.
Identifiers: *Outer Continental Shelf, Oil recovery systems, System design.

The primary objective of this work was to demonstrate the feasibility of a new oil control/recovery system concept in a fast current environment. This system consists of two basic components, the control function (a vented hydrofoil) and a recovery function (a rotating belt of polyurethane foam). The system is operated in the following manner: A thin layer of oil and water is separated by and passes over the top of the lead hydrofoil. A large portion of the remaining water in the oil/water layer is vented through a slot which separates the leading hydrofoil from the main hydrofoil. The remaining oil/water flow, which now contains a higher concentration of oil, passes over the main hydrofoil and is directed by a small ramp, placed at the rear of the main hydrofoil, tangentially onto the rotating belt of polyurethane foam. The water drains through the foam belt while retaining the oil until it is squeezed out and pumped to a storage container. Numerous experiments were performed with both small and full scale models in calm, wavy and choppy water conditions. Deficiencies in the full scale hardware design limited the device's operation to a small range of velocities; however, an 80% overall throughput efficiency was achieved. Therefore, the results of this study have shown that the vented hydrofoil/polyurethane foam belt oil control/recovery system is a viable one. (Sinha-OEIS)
W77-03904

TESTS OF COAST GUARD DEVELOPED HIGH SEAS OIL RECOVERY SYSTEMS AT EPA OHMSETT,
Coast Guard, Washington, D.C.
W. J. Chang.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 495, Price codes: A07 in paper copy, A01 in microfiche. Report No. CG-D-101-75, June 1975. 129 p, 17 fig, 6 tab, 3 ref, 6 append. DOT-CG-43,520A and 41, 546A.

Descriptors: *Oil pollution, *Oil spills, *Water pollution control, *Baseline studies, Instrumentation, *Skimming, Pollution abatement, Separation techniques.
Identifiers: *Outer Continental Shelf, *Oil recovery systems, Oil skimmers.

The full scale tank testing of Coast Guard developed High Seas Oil Recovery Systems which was conducted at the Environmental Protection Agency's Oil and Hazardous Materials Simulated Environmental Test Tank (EPA OHMSETT) in Leonardo, New Jersey is summarized. The tests were conducted during July through September of 1974. The objectives of the tests were: (1) to obtain quantitative and qualitative measures of performance for the Lockheed High Seas Oil Recovery System HSORS and the Ocean Systems Oil Recovery System 1000 (ORS 1000) and (2) to develop a standard test plan for the testing of oil skimmers. The tests were controlled and instrumented so as to give data on the oil recovery rate, oil recovery efficiency, and thruput efficiencies attained over a wide range of conditions. A description of the test apparatus, the standard test plan employed, the instrumentation used, and the data reduction and analysis are included in the report. (Sinha-OEIS)
W77-03905

THE HYDRODYNAMICS OF POROUS BARRIER OIL RECOVERY SYSTEMS,
Texas A and M Research Foundation, College Station.
D. J. Norton, and J. L. Rand.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 501, Price codes: A05 in paper copy, A01 in microfiche. U.S. Coast Guard Office of Research and Development, Report No. CG-D-146-75, July 1975. 73 p, 4 ref, append. DOT-CG-4244A.

Descriptors: *Oil pollution, *Hydrodynamics, *Pollution abatement, *Water pollution control, Currents, Separation techniques.
Identifiers: *Outer Continental Shelf, *Oil recovery systems, Porous barriers.

The porous barrier concept consists of a solid barrier with several upstream porous barriers. The porous barriers act to dissipate the energy of the flow through them and to divert flow under the solid barrier in a gradual manner. The use of the porous barriers allows operation of a solid barrier or boom in currents well above the critical speed for a single solid barrier. The success of the concept depends upon the number, type, and placement of the porous barriers. During the present investigation, some 20 porous materials were classified as to their drag properties. Velocity measurements were made between combinations of these barriers, and oil recovery tests were run. Data has been collected for free stream velocities from 0.8 to 5.0 fps. Both Diesel No. 2 and 140 wt. lube oil were employed. Tests in the Texas A and M flume indicated that virtually all the oil could be contained up to 4.5 fps for Diesel No. 2. Above that speed losses were noted for the configurations tested. Testing in the University of Michigan's flow channel facility for velocities up to 7 fps confirmed these observations with oil viscosities up to 580 centistokes. (Sinha-OEIS)
W77-03906

DEVELOPMENT OF AN OIL-WATER POLLUTION MONITORING SYSTEM,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 5A.
W77-03908

AN OIL SLICK SAMPLING SYSTEM,
Coast Guard Research and Development Center, Groton, Conn.
For primary bibliographic entry see Field 5A.
W77-03909

CRUDE OIL SPILLS RESEARCH. AN INVESTIGATION AND EVALUATION OF ANALYTICAL TECHNIQUES,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 5A.
W77-03910

MEASUREMENT OF VOLATILE AND NON-VOLATILE HYDROCARBONS IN SELECTED AREAS OF THE ATLANTIC OCEAN,
Exxon Research and Engineering Co., Linden, N.J. Analytical and Information Div.
For primary bibliographic entry see Field 5A.
W77-03911

FAST CURRENT OIL RESPONSE SYSTEM - STAGE I, SVROS DEVELOPMENT,
Hydronautic, Inc., Laurel, Md.
W. T. Lindenmuth, T. R. Sundaram, and A. M. Sinnarwalla.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A014 500, Price codes: A05 in paper copy, A01 in microfiche. U.S. Coast Guard, Office of Research and Development, Report No. CG-D-36-75, March 1975. 93 p, 28 fig, 1 tab, 12 ref. DOT-CG-40218-A.

Descriptors: *Oil spills, *Oil pollution, *Skimming, Resources development, *Baseline studies, Equipment, Water pollution treatment, *Pollution abatement.
Identifiers: Outer Continental Shelf, Oil recovery systems, Oil skimmers.

Combined theoretical and experimental studies show the effects of several parameters on the formation of a thickened pool of oil inside the Surface Velocity Retarder Oil Skimmer (SVROS), an energy absorbing device designed to recover thin oil slicks in high relative currents. This collection device is composed of an array of closely spaced flat plates that serve to gradually dissipate the kinetic energy of the oil/water inflow so that the oil can be collected without the entrainment losses typical of simple oil booms in currents exceeding about one knot. Model tests were performed in prototype scale with thin models of the device in an 80 foot long towing tank and in a recirculating flume. Test variables included velocity, oil type, slick thickness, and model geometry. The final model configuration utilized several interchangeable modules so that pool formation was controlled over the wide range of inflow parameters to optimize the purity and efficiency of oil withdrawal from the SVROS. Curves defining the recovery performance are presented that show essentially complete oil recovery up to 5 fps with thin slicks of light fuel oil such as Diesel fuel. Performance degrades with increases in velocity, viscosity and incident wave height. (Sinha-OEIS)
W77-03920

DETERMINING THE CONCENTRATION OF OIL IN WATER SAMPLES BY INFRARED SPECTROPHOTOMETRY, PHASE I - SAMPLE AGING STUDY,
Naval Ship Research and Development Center, Annapolis, Md. Materials Dept.
For primary bibliographic entry see Field 5A.
W77-03922

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES. VOL VI. IMPACT OF OFFSHORE TERMINALS ON CONTIGUOUS PORTS,
Harris (Frederic R.), Inc., New York.
R. L. Forster, J. E. Moyer, and M. Lepeau.
Available from the National Technical Information Service, Springfield, VA 22161 as COM-75-10765, Price codes: A05 in paper copy, A01 in microfiche. U.S. Department of Commerce, Maritime Administration Report No. MA-GEN-970-75067, March 1975. 92 p, 5 fig, 44 ref, 2 append. 2-36202 Mod. 6.

Descriptors: *Oily water, *Oil pollution, *Water pollution, *Waste disposal, *Transportation water pollution sources.
Identifiers: Outer Continental Shelf, *Crude oil, Offshore terminals, Deepwater ports, Bilge water, Supertankers, Refineries, Tankers, Ports.

The impact of the energy crisis, embargoes and environmental concerns of transportation of crude oil and petroleum products to potential offshore receiving terminals is discussed. As the proposed refinery construction programs are directly related to offshore terminal construction, the import of the various refinery construction programs on offshore terminals and the movement of produce by product tankers is analyzed. Published plans

are separated into three categories: (1) refinery plans likely to be implemented: (2) refinery plans whose implementation is uncertain; and (3) refinery plans which are not likely to be implemented. The various ports on the three coasts are analyzed with respect to sizes of tankers that may be accommodated and a vessel mix is developed. From this mix and the forecast petroleum demand, tanker movement requirements are estimated. These estimates are used to develop four arrival matrices for 1980 and for 1985 -- for PAD I and PAD III. Three arrival matrices are developed for PAD V over the same period. From these matrices based on assumed enforcement of the 1973 IMCO Convention, the quantities of oily wastes likely to arrive at given ports on the three seacoasts are estimated. The types of offshore terminals are discussed and the various proposed sites are mentioned. The various proposed U.S. refineries are tabulated and classified as to likelihood of construction. (See also W76-05830 and W74-10357) (Sinha-OEIS)
W77-03923

ECONOMIC MODELING FOR WATER POLICY EVALUATION.
For primary bibliographic entry see Field 6A.
W77-03924

MODELING AND INFORMATION HANDLING IN ENVIRONMENTAL SCIENCE,
American Univ., Washington, D. C. Coll. of Public Affairs.
M. Sager.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 21-28. 1 fig, 1 tab, 1 ref.

Descriptors: *Water pollution control, *Model studies, *Water resources development, History, Environment, Water policy, Simulation analysis, Optimization, Systems analysis, Legislation.
Identifiers: Environmental science, Information handling.

This paper reviews the current status of modeling efforts in water resources development, with particular emphasis on water quality. After giving a history of mandatory water pollution control and the science of information handling, water resources modeling is categorized and discussed: the two model categories identified are descriptive and management. An outline is presented of water resources models currently on line; considered are model/decision area (i.e., regional water supply analysis), general type (i.e., linear programming), and important characteristics (i.e., finds optimal supply investment for a given demand). Finally, substantive issues for which solutions have not yet been found are listed. It is concluded that the first several years of our national efforts at meeting the legislative mandate for control of the national water pollution problems have been successful as far as definitive isolation of problem areas. (See also W77-03924) (Bell-Cornell)
W77-03926

MODELS OF AGRICULTURAL WATER, LAND USE AND THE ENVIRONMENT,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 6A.
W77-03927

WATER QUALITY MANAGEMENT AND THE DISTRIBUTION OF EMISSION RIGHTS BY SEALED TENDER MARKETS,
Geological Survey, Washington, D. C.
E. D. Attanasi.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall et al.) North-Holland/TIMS Studies in the Management Sciences, Holland/American Elsevier, New York, N.Y., p 113-123, 1976. 1 fig, 1 ref, 1 append.

Descriptors: *Water quality control, *Management, *Economics, *Pricing, Reach(Streams), River basins, Planning, Treatment, Costs, Decision making, Mathematical models, Equations, Systems analysis.
Identifiers: *Firm model, Bidding strategies, Emission rights.

As an alternative to water quality management by effluent standards or charges, this paper presents a sequential bidding model used to investigate firm responses to alternative River Basin Authority (RBA) regulatory controls, taxation measures and institutional arrangements when emission rights are allocated by sealed tender markets. The results suggest that because such measures influence bid levels, observed bid prices will not generally represent the bidder's marginal costs of waste treatment. A description of the assumed institutional structure and the firm model are given. Short-run bidding strategies are derived and related to market regulation policies where it is assumed that the emission rights are distributed on the basis of individual stream reaches. Alternative regulatory policies are evaluated in terms of their potential for control of economic rents accruing to firms exploiting a public resource and induced influence on bid prices. Implications of the analysis for utilization of both informational and allocative functions of the market for basin-wide planning decisions are also discussed. The assimilative capacity of a stream is considered as a public resource. The model assumes a linear utility and is assumed to maximize some criterion function over a planning bidding situations. Results suggest that observed bids not only reflect marginal costs of internal waste treatment but also risk attitudes, market conditions and RBA taxation policies. (See also W77-03924) (Bell-Cornell)
W77-03931

INCORPORATING OUTDOOR RECREATION IN A MODEL OF STREAM FLOW REGULATION AND WATER QUALITY IMPROVEMENT,
Technion-Israel Inst. of Tech., Haifa.
M. Barnea, U. Shamir, and M. Shechter.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., p 125-155, 1976. 5 fig, 1 tab, 31 ref.

Descriptors: *Water quality control, *Recreation, *Demand, *Streamflow, *Regulation, *Simulation analysis, Improvement, Semiarid climates, *Water pollution control, *Water resources, Estimating, Benefits, Irrigation, Sewage treatment, Equations, Mathematical models, Systems analysis, Economics, Forecasting.

Considered is the outdoor recreation demand relating to water-oriented activities in semi-arid Israel. This paper investigates the possibilities of incorporating outdoor recreation among other uses of water bodies situated in the relative vicinity of dense urban centers. An existing sewage treatment problem is reformulated as a comprehensive model of streamflow regulation and water quality control, which includes recreation as a major output. The novelty of this approach lies in the explicit incorporation of a demand submodel for predicting attendance at, and evaluating benefits of, water-based outdoor recreation activities within the framework of the comprehensive model. Discussed is the nature of recreation as an economic good, yielding real benefits to individuals. Described is a model of the river basin and streamflow modification, in which recreation is one of the major outputs in addition to irrigation, industrial, and household uses of fresh water and treated effluents. The inputs are natural inflows, industrial and domestic effluents, recycled water from the river itself, and interregional transfers. The flow and quality regulation system includes reservoirs for recreational activities, water treatment, and natural flow catchment, treatment plants, and a conduit system for recycling and water transfers. The problem is solved via nonstochastic computer simulation. The objective function sums up the benefits from project outputs. The technique developed could be used in conjunction with an optimization model. (See also W77-03924) (Bell-Cornell)
W77-03932

MODELING PROCESS SUBSTITUTIONS BY LP AND MIP,
Resources for the Future, Inc., Washington, D. C.
J. W. Sawyer, Jr., B. T. Bower, and G. O. G. Lof.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., p 157-178, 1976. 3 fig, 8 tab, 9 ref, 1 append.

Descriptors: *Water quality control, *Waste water disposal, *Linear programming, *Management, *Industrial wastes, Alternative planning, Optimization, Economics, Effluents, Streams, Costs, Waste water treatment, Constraints, Biochemical oxygen demand, Suspended solids, Equations, Mathematical models, Systems analysis.
Identifiers: *Mixed integer programming, Cost minimization, Paper industry, Waterborne residuals, Lower Delaware Valley, Residuals reduction.

Investigated are formulations for modeling liquid residuals management in industrial plants. Linear programming (LP) and mixed integer programming (MIP) formulations are presented for liquid residuals modification activities in a single plant, involving the removal of two or more materials, the removals of which may be interactive, which occur concurrently, and whose marginal costs of removal vary with the level of both of the activities. The linear programming model compactly expresses some water quality processing technology alternatives for paper mills and the costs of water quality consequences of some of the various liquid residuals modification alternatives which can be employed. The model is designed as a submodel of the Resources for the Future's Lower Delaware Valley Model, and is therefore designed to combine with a waste paper availability model, an air pollution model, and a model of the Delaware Estuary aquatic ecosystem. The MIP is discussed in terms of its advantages and disadvantages. Results of both the LP and the MIP formulations for finding the minimum cost alternatives are given. It is concluded that if the number of integer variables is relatively small (about 10 or less), MIP models are preferable. For large numbers of integer variables, reduce the number of variables to those which are most important or use an LP formulation. (See also W77-03924) (Bell-Cornell)
W77-03933

QUASI-PUBLIC GOODS: PRICING THE COMMONS,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 6A.
W77-03936

PROCEEDINGS FOR SECOND ANNUAL CONFERENCE ON THE RESTORATION OF COASTAL VEGETATION IN FLORIDA.
Hillsborough Community Coll., Tampa, Fla.
Held on May 17, 1975 at Hillsborough Community College, Tampa, Florida. Edited by R. R. Lewis, III.

Descriptors: *Intertidal areas, *Conferences, *Mangrove Swamps, *Reforestation, *Revegetation, *Planting management, *Florida, Trees, Salt marshes, Erosion control, Vegetation establishment, Estuaries, Tidal effects, Growth rates, Spoil banks, Bays, Succession, Grasses, Federal Water Pollution Control Act, Navigable waters, Vegetation regrowth.

Identifiers: *Seagrass, *Mangrove, Halodule wrightii, Thalassia testudinum, Corps of Engineers, Rhizophora mangle, Avicennia germinans, Laguncularia racemosa, Spartina alterniflora, Propagation.

Conference topics ranged from implications of the Federal Water Pollution Control Act Amendments of 1972 with respect to the Corps of Engineers' definition of 'navigable waters,' to revegetation of estuaries, bays, and canal banks by Thalassia testudinum and Spartina alterniflora and reforestation by three species of mangroves--Rhizophora mangle (red), Laguncularia racemosa (white), and Avicennia germinans (black). Substrate, site location, propagation, secondary succession, and transplantation techniques are discussed for both the herbaceous vegetation and the trees. The volume is supplemented by bibliographies on aquaculture containing 10 citations; on the ecology of halophytes containing 27 citations; and 22 titles of contributions to the first annual conference on the restoration of coastal vegetation in Florida held in 1974. A general reference on subjects related to coastal stabilization and coastal flora contains 80 citations; salt marsh ecology and flora are cited in 56 references; seagrasses are discussed in 37 references; and mangroves in 27. (See W77-03943 thru W77-03952) (Auen-Wisconsin)
W77-03942

KEYNOTE SPEECH, SECOND ANNUAL CONFERENCE ON RESTORATION OF COASTAL VEGETATION IN FLORIDA,
Environmental Protection Agency, Atlanta, Ga.
S. S. Turnipseed.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p 3-11.

Descriptors: *Florida, *Coastal marshes, *Federal Water Pollution Control Act, *Jurisdiction, *Navigable waters, Judicial decisions, Tidal marshes, Tidal waters, Land forming, Inland waterways, Permits, Landfills, Legal aspects, Water rights.
Identifiers: *Corps of Engineers, Dredged spoil disposal.

The disinclination of the Corps of Engineers to comply with the provisions of the Federal Water Pollution Control Act Amendments of 1972 as related to disposal of dredged and fill materials in tidal wetlands and the Corps jurisdiction and definition of 'navigable waters' is discussed. In an effort to define its jurisdiction the Corps published four alternatives to its proposed regulations. The Corps preferrential Altervative IV is faulted in that tributaries outside of primary tributaries are not recognized; that the extent of regulation of the main streams and primary tributaries is limited to the reach of the high water mark; and the rigid rules required for state certification before the Corps will process a permit application. However, the concepts of jurisdiction contained in Alternative I agree with the Act's definition of 'navigable waters' and recent court decisions; it also encourages state participation in the permitting process under Section 404 of the Act, which is not intended to ban all filling activities but is legislated to protect the intertidal wetland ecosystems from capricious destruction. Any alternative chosen from the four choices submitted by the Corps will be evaluated in the context of final guidelines published by the EPA. (See also W77-03942) (Auen-Wisconsin)
W77-03943

REVEGETATION OF THALASSIA TESTUDINUM IN A MULTIPLE-STRESSED ESTUARY, NORTH BISCAYNE BAY, FLORIDA,
Miami Univ., Fla. Dept. of Microbiology.
A. Thorhaug, and R. Hixon.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p 12-27. 2 fig, 1 tab, 12 ref.

Descriptors: *Revegetation, *Estuaries, *Bays, *Florida, Spoil banks, Dredging, Vegetation establishment, Marine plants, Benthic flora, Vegetation regrowth, Currents(Water), Waves(Water), Turbidity, Suspension.
Identifiers: *Seagrass, Thalassia testudinum, *North Biscayne Bay(Fla), Turtle grass.

Investigations with seagrass revegetation of North Biscayne Bay, to enhance productivity reduced by dredging, dredged materials, filling, and channeling with seedlings of the endemic Thalassia testudinum, are described. Plant survival and growth in eight test locations indicated that they are dependent on tidal currents, wave action induced by oceanic surf and the wake of large boats, inducing sediment suspension and turbidity. The substrate type was another important variable; sediments in the gravel particle size did not support abundant or diverse vegetation as compared to finer particle size; muddy sediments supported better growth than pure sand. The rapid regrowth of secondary (or pioneer) seagrass in several of the monitored areas indicated that nutrient availability, light and level of pollutants would be sufficient for the turtle grass growth if plants could be reestablished. A major factor contributing to the absence of Thalassia in the north bay is that the turtle grass population in South Biscayne Bay is not a prolifically-fruiting colony. For Thalassia to reestablish itself naturally, either seeds or apical meristems would have to reinvade the basins of North Biscayne Bay, but meristem reinvasion appears to be unlikely because of the deep turbid areas between the basins. However manual revegetation appears to be promising. (See also W77-03942) (Auen-Wisconsin)
W77-03944

SEAGRASS REVEGETATION ATTEMPTS IN ESCAMBIA BAY, FLORIDA, DURING 1974,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
R. G. Rogers, and F. T. Bisterfeld.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p 28-34. 12 ref.

Descriptors: *Revegetation, *Estuaries, *Bays, *Florida, Planting management, Vegetation establishment, Marine plants, Benthic flora, Vegetation regrowth.
Identifiers: *Seagrass, Halodule wrightii, *Escambia Bay(Fla), Shoal grass.

The revegetation of Escambia Bay with the low salinity-tolerant Halodule wrightii is described. This species is hardy, is able to inhabit intertidal areas, and survives short exposures to air. A plug with a 7.5 cm diameter and 12.5 cm depth of H. wrightii was obtained from a healthy bed in adjacent East Bay and placed into snug fitting burlap bags. Light, tight containers were used to transport the plug, which was replanted within three hours. Transplants were placed at five depths ranging from 0.3 to 1.0 m (1 to 3 ft) MSL at 0.15 m (0.5 ft) intervals. Ten plugs were planted at each depth during July and September. A total of 100 plugs per site and 400 plugs were planted in all. Survival for the July transplants after 13 weeks was 51%. Plugs transplanted in September showed a 67% survival after six weeks. Excessive sand transport inhibited growth rates and survival in one site. After overwintering 37% had green leaves at one site; another site had less that 10% survival; however, the leaves were free of encumbrance, indicating recent new spring growth and other plugs may sprout out as the water warms. (See also W77-03942) (Auen-Wisconsin)
W77-03945

LOSS OF SUBMERGED VEGETATION IN THE PENSACOLA BAY SYSTEM,
Environmental Protection Agency, Sabine Island, Fla. Escambia Bay Recovery Study.
R. G. Rogers, and F. T. Bisterfeld.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 36-50. 5 fig., 6 ref.

Descriptors: *Aerial photography, *Vegetation, *Estuaries, *Bays, *Distribution, *Florida, Marine plants, Benthic flora, Mapping, Pollutant identification.
Identifiers: Seagrass, *Pensacola estuary(Fla).

Aerial photography conducted in 1974 and indicating the extent of vegetation loss since 1949 showed that all seagrasses (Thalassia and Halodule) were gone except for one bed on the northeast shore of East Bay. This had diminished significantly but was persisting. This shoreline was the least altered by man and seemed to have the least beach erosion. The other persistent specie was Vallisneria americana, essentially a freshwater specie, which appeared to be thriving but had diminished in the upper Escambia Bay. In 1974 and 1975 there had been an expansion of Vallisneria in the Escambia delta area. The vegetation loss is attributed to the synergistic effects of sewage and industrial waste effluents, dredging and filling, beachfront alteration and changing watershed characteristics. Along the southern shore of East Bay bulkheads and groins likely caused changes in nearshore water movement and, consequently, erosion of seagrass beds. Industrial wastes affected the vegetation in the northeast section of Escambia Bay since these effluents remain near shore in that area. The only location where seagrasses had remained relatively stable was Santa Rosa Sound. This area should be considered as endangered, however, and efforts should be made to preserve the integrity of these seagrass beds. (See also W77-03942) (Auen-Wisconsin)
W77-03946

PATTERNS OF SECONDARY SUCCESSION IN A MANGROVE COMMUNITY, TAMPA BAY, FLORIDA,
East Stroudsburg State Coll., Pa. Dept. of Biology.
T. Detweiler, F. M. Dunstan, R. R. Lewis, and W. K. Fehring.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 52-80. 12 fig., 3 tab., 19 ref.

Descriptors: *Mangrove swamps, *Tidal marshes, *Succession, *Revegetation, *Florida, Intertidal areas, Reforestation.
Identifiers: *Mangroves, Tampa Bay(Fla), Rhizophora mangle, Avicennia germinans, Laguncularia racemosa.

A mangrove community, first disturbed by mosquito ditching then by bulldozing, on the eastern shoreline of Tampa Bay was investigated to determine its secondary succession. While Laguncularia racemosa (white mangrove), Avicennia germinans (black mangrove), and Rhizophora mangle (red mangrove), in that order, were the major species in an adjacent relatively-undisturbed control area, Salicornia virginica and Spartina alterniflora predominated in the early secondary succession pattern of the affected study area. A. germinans and L. racemosa were recovering well, but R. mangle recovery appeared very slow. The herbaceous plants, S. virginica increased its abundance and distribution along the elevation gradient while Batic maritima was restricted to its former abundance and expansion range. An interesting relationship was observed between the distribution of the vegetation in both areas and the recognition of the mean high water line (+1.5 ft SLD). The distribution elevation was 1.64 ft SLD for all vegetation in the control area but in the disturbed area the distribution was at the

+1.55 ft SLD. It was presumed that B. maritima and S. virginica were at their peak of seaward expansion but S. alterniflora may expand into the former R. mangle zone (low marsh). Total recovery, based on the size of the trees destroyed, is expected to be within 50-75 years. (See also W77-03942) (Auen-Wisconsin)
W77-03947

THE POSSIBLE ROLE OF SPARTINA ALTERNIFLORA LOISEL IN ESTABLISHMENT OF MANGROVES IN FLORIDA,
Hillsborough Community Coll., Tampa, Fla. Dept. of Biology.
R. R. Lewis, and F. M. Dunstan.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 82-100. 13 fig., 19 ref.

Descriptors: *Succession, *Revegetation, *Intertidal areas, Estuaries, Bays, Spoil banks, Mangrove swamps, Islands, Reforestation, Vegetation establishment, *Florida, Grasses.
Identifiers: *Spartina alterniflora, *Mangroves, *Tampa Bay(Fla), Cord grass.

The potential importance of Spartina alterniflora as part of the successional pattern of mangroves is examined in investigations of four sites in eastern Tampa Bay: two spoil islands, a natural mangrove island and a mangrove forest cleared in 1971 and now in the process of secondary succession. A 'doughnut' effect observed in the Spartina colonization is due to the contrast between one year's flowering stems and the following year's new growth, which is consistent with the primary means of reproduction by rhizomes. Examination of these 'doughnuts' showed young mangrove seedlings located in the center. All three mangroves (Rhizophora mangle, Avicennia germinans, and Laguncularia racemosa) were found. There was also evidence of shading out and elimination of some Spartina by the larger mangroves. The implication is that when considering planting vegetation on spoil material, the natural successional pattern of the specific site should be considered to determine the best approach. When compared with the generally slow growing characteristics of mangroves, particularly in Tampa Bay, it is apparent that the initial use of S. alterniflora on spoil material would be more advantageous as opposed to direct plantings of mangroves. (See also W77-03942) (Auen-Wisconsin)
W77-03948

EFFORTS IN MARINE REVEGETATION IN ARTIFICIAL HABITATS,
Marco Applied Marine Ecology Station, Marco Island, Fla.
J. C. Kinch.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 102-111. 2 fig., 1 tab., 1 ref.

Descriptors: *Revegetation, *Spoil banks, *Intertidal areas, Bays, *Florida, Growth rates, Vegetation establishment, Islands, Canals, Reforestation, Vegetation regrowth.
Identifiers: Marco Island(Fla), *Roberts Bay(Fla), Mangrove, Seagrass, Thalassia testudinum.

Revegetation attempts with mangroves on two spoil islands in Roberts Bay (Florida) and with the seagrass Thalassia on the submerged slopes of seawalled canals, are detailed. During 1972-1973, 2477 mangrove trees 2-3 ft and 4-8 ft in height with 8-15 in. root balls were planted on the islands. The transplants grew less than half of trees in a natural site. After three years, only 389 trees survived (15.7%) of the total planted. The high mortality is variously attributed to the unconsolidated substrate of the islands, loss of elevation which increased erosion, and possibly extreme exposure to wind and sun. Thalassia transplants on the submerged slopes of the canals required secure anchorage to ensure viability. The method consisted of planting individual short shoots of the plant without its rhizome and tying the shoot to a short length of construction tie rod. Two four-week old plots exhibited high mortality and poor viability, although one five-week old plot lost only 20% of the plants with the remaining in good condition. The low success is attributed to the substrate and lack of care in planting. Treatment with napthalene acetic acid and careful planting site preparation should enhance survival of subsequent plantings. (See also W77-03942) (Auen-Wisconsin)
W77-03949

ASPECTS OF RED MANGROVE REFORESTATION IN FLORIDA,
Florida Inst. of Tech., Jensen Beach. Environmental Studies.
J. Hannan.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 112-121. 5 ref.

Descriptors: *Mangrove swamps, *Reforestation, *Florida, Trees, Intertidal areas, Estuaries, Erosion, Tidal effects, Growth rates, Vegetation regrowth.
Identifiers: Mangrove, Rhizophora mangle, *Indian River(Fla), *Red mangrove.

Experimental plantings of red mangrove (Rhizophora mangle) in the vicinity of St. Lucie Inlet in the Indian River (Florida) generated the following conclusions: Four- to six-year old trees are preferred to seedlings, because among other destructive forces, seedlings are destroyed by wave thrown objects. Planting-size trees can be obtained from mosquito impoundment ditch banks, where they are usually killed at sporadic intervals during ditch repairs. The root-ball method of transplanting produces excellent results (80% to 100% survival) when planted at the natural depth, with leaves intact. Planting two to four inches deeper causes high mortality and retards growth. Leaf stripping of new transplants results in an initial spurt of growth, but subsequently leaf-stripped plants does not match leaf production of control groups. The isopod Sphaeroma killed all trees planted below the mid-tidal zone in the Indian River. Erosion was not controlled by the transplanted trees at any site. Trees fell if the sand around their roots was washed away in conjunction with overall beach erosion; tires were of no help in preventing this. Wind exposure had no effect on leaf production. Transplants survived only at a site protected from wind and waves, but more importantly, because Sphaeroma populations were reduced due to low dissolved oxygen levels at night. (See also W77-03942) (Auen-Wisconsin)
W77-03950

SUGGESTED MANGROVE TRANSPLANTING TECHNIQUES,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
T. R. Pulver.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 122-131. 1 fig., 3 ref.

Descriptors: *Reforestation, *Mangrove swamps, *Planting management, *Florida, Trees, Intertidal areas, Salt marshes, Root development.
Identifiers: Mangroves, Rhizophora mangle, Laguncularia racemosa, Propagation, Avicennia germinans.

Handling and planting experiments indicated that 0.5 to 1.5 m high mangrove trees (Rhizophora mangle, Avicennia germinans, Laguncularia racemosa) could successfully be used as transplant stock in coastal restoration programs. Pruning enhanced replant recovery in each species, yielding slightly less defoliation and more growth than with unpruned transplants. Survival rates were excellent. A root ball diameter approximately one-half of the original tree height is generally sufficient to sustain a 0.5 to 1.5 m mangrove through the recovery period; Rhizophora proproots should be included in the root ball when possible; if severed they should be left on the tree without further pruning for possible regrowth. The root covering soil should be watered, especially in less inundated areas and when settled, the tree should be at approximately the original groundlevel. Pneumatophores or proproots should be uncovered to maintain aeration of subterranean roots. Planting of mixed stands is advisable to gain all the advantages offered by each species. Presence of scattered mangroves, established seedlings, other salt marsh vegetation, or fine muddy substrate are natural indicators of favorable substrate stability. Trees may be propagated by air layering or rooted cuttings to produce a faster nursery stock. Every second tree (0.5 to 1.5 m size class) in naturally dense stands can be removed for transplant stock providing that care is taken in the removal process. (See also W77-03942) (Auen-Wisconsin)
W77-03951

PLANTINGS OF RED MANGROVE (RHIZOPHORA MANGLE L.) IN CHARLOTTE AND ST. LUCIE COUNTIES, FLORIDA,
Miami Univ., Coral Gables. Dept. of Biology.
H. J. Teas, W. Jurgens, and M. C. Kimball.
In: Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida, May 17, 1975, Hillsborough Community College, Tampa, Florida, p. 132-161. 16 fig., 16 ref.

Descriptors: *Mangrove swamps, *Reforestation, *Intertidal areas, *Planting management, *Florida, Salt marshes, Estuaries, Revegetation, Trees, Erosion control, Vegetation establishment, Social aspects.
Identifiers: Mangrove, Rhizophora managle, Charlotte County(Fla), St. Lucie County(Fla), *Coral Reef Waterway(Fla), Human despoliation, *Red mangrove.

Factors that affected the survival of red mangrove seedlings hand-planted at three sites for shoreline stabilization and at one site for restoration of a tidal creek, are detailed. Probably the most important such factor was the shoreline energy--the sum of forces applied by waves, wind, currents, and boat wakes. Human despoliation was a major problem in seedling establishment in the more urbanized areas. Planting through jute mesh was ineffective in stabilizing seedlings at a moderate energy shore. Elevation in relation to tidal levels was a significant factor as seedlings successfully established in low energy areas at elevations ranging from mean high water to mean low water. Competition from natural white and black mangrove seedlings was partly a function of tidal elevation. Experimental plantings that extended above the mean high tide level and below the mean low tide level will have a lower survival rate than more conservative plantings. The size of the seedlings did not substantially influence establishment as seedlings at all stages of development were easily dislodged from high and moderate energy areas. Plantings were not adversely affected by non-marine fill material but optimum mangrove growth occurs on soils containing high levels of organic matter and nutrients. (See also W77-03942) (Auen-Wisconsin)
W77-03952

A NOTE ON EFFLUENT CHARGES AND MARKET STRUCTURE,
State Univ. of New York at Binghamton. Economic Growth Inst.
V. K. Smith.
Journal of Environmental Economics and Management, Vol. 2, No. 4, p. 309-311, 1976. 8 ref.

Descriptors: *Pollution abatement, *Pollution taxes(Charges), Market value, Economics, Taxes, Regulation.
Identifiers: *Effluent charges, *Market structure.

In a reexamination of the role of the market structure in setting effluent charges, comparison is made of tax systems based on minimizing the resource input costs of pollution abatement, versus tax systems which also consider the value of the output vectors associated with pre-tax and post-tax allocations. A simple model is developed which shows that efficient resource allocation in the presence of product market distortions and a pollution externality requires two policy instruments. In the study, discussion is given concerning disagreements among environmental economists regarding the usefulness of Pigouvian taxes as corrective instruments for external diseconomies in pollution reduction by private sector organizations. Definitions of costs are compared, as derived from analysis of two philosophies of effluent charges: (1) that a tax rate set at a level that achieves the desired reduction in the total emissions of pollutants will satisfy the necessary conditions for the minimization of the program's cost to society; and (2) that imposing the same per unit pollution tax on each firm will not result in a minimum cost reduction in pollution. (Harris-Wisconsin)
W77-03955

POLLUTION, WELFARE, AND ENVIRONMENTAL POLICY IN THE THEORY OF COMPARATIVE ADVANTAGE,
Northwestern Univ., Evanston, Ill. Center for Mathematical Studies in Economics and Management Science.
For primary bibliographic entry see Field 6G.
W77-03958

EFFLUENT CHARGES AND LICENSES UNDER UNCERTAINTY,
Harvard Univ., Cambridge, Mass. Dept. of Economics.
M. J. Roberts, and M. Spence.
Journal of Public Economics, Vol. 5, No. 3-4, p. 193-208, 1976. 5 fig., 1 tab., 4 ref. NSF GS-39004.

Descriptors: *Permits, *Pollution abatement, *Pollution taxes(Charges), Economics, Taxes, Market value, Regulation, Costs.
Identifiers: *Effluent charges, *Licenses(Pollution).

Pollution control systems based on use of effluent charges are studied under special conditions when regulatory authorities are uncertain about the costs which would have to be borne by private sector firms in cleanup activities. A mixed system, involving effluent charges and restrictions on the total quantity of emissions through use of marketable licenses, is preferable to either effluent fees or the licenses used separately. This is based on the assumption that a mixed system permits the implicit penalty function imposed on the private sector to more closely approximate the expected damage function for pollution at each level of total waste output. A model is described and a mixed effluent fee and license scheme is analyzed in which the regulatory authority has three manipulable parameters: a subsidy, a penalty and a stock of licenses. The authority knows that pollution will equal the stock of licenses, provided the market price turns out to be between the subsidy and the penalty. The subsidy provides a residual incentive for firms to clean up even more when costs are low. The finite penalty provides an escape valve in case costs are very high. The aggregate damage function is approximated by a piece-wise linear penalty function. But once the equilibrium in license prices is established, each firm effectively faces a linear penalty function whose slope is the price of the license. As a result, marginal cleanup costs are equalized and total cleanup costs are minimized. (Harris-Wisconsin)
W77-03959

PUBLIC CHOICE AND URBAN WATER QUALITY,
Georgia Univ., Athens.
For primary bibliographic entry see Field 6B.
W77-03960

EXAMINATION OF ENVIRONMENTAL POLICIES USING PRODUCTION AND POLLUTION MICROPARAMETER DISTRIBUTIONS,
Tel-Aviv Univ. (Israel). Foerder Inst. for Economic Research.
For primary bibliographic entry see Field 6G.
W77-03961

THE SYMMETRY OF EFFLUENT CHARGES AND SUBSIDIES FOR POLLUTION CONTROL,
Toronto Univ. (Ontario). Inst. for Environmental Studies and Engineering.
D. N. Dewees, and W. A. Sims.
Canadian Journal of Economics, Vol. IX, No. 2, p. 323-331, 1976. 3 fig., 14 ref.

Descriptors: *Pollution abatement, *Pollution taxes(Charges), Prices, *Costs, Efficiences, Evaluation, Feasibility, Government supports, Water pollution control.
Identifiers: *Effluent charges, Subsidy.

Whether a subsidy paid to polluters who reduce their emissions has the same efficiency characteristics as an effluent charge is examined. It is concluded that the symmetry between the types of pollution control is not merely limited; it is non-existent. Three sources of asymmetry were found. First, the short-run problem of finding a base point from which the subsidy should be paid necessitates an estimation of what would have been emitted in the absence of the subsidy. The second source of asymmetry involves entry to or exit from the industry. Since a subsidy scheme which raises prices encourages entry, subsidizing potential entrants and exitors could bankrupt the pollution control authority. If on the other hand only active firms were subsidized, emissions are likely to be increased over unregulated levels. Both of these postulates are compounded by a third set of problems, based on the fact that the subsidy is discontinuous. This discontinuity means that the marginal cost curve must be discontinuous, and the average cost curve altered. The revised cost curves mean that the firm output will be larger than without intervention, and in the only possibly symmetrical case, price will be lower and industry emissions higher than those in the effluent charge case. (Luedtke-Wisconsin)
W77-03962

IRRIGATION EFFICIENCY, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 3F.
W77-03968

THE APPLICATION OF BOREHOLE GEOPHYSICS TO THE SELECTION AND MONITORING OF NUCLEAR WASTE DISPOSAL SITES,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5E.
W77-03970

APPLICATION OF GAME THEORY IN WATER MANAGEMENT,
Water Resources Center, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W77-04009

A SCIENTIFIC BASIS FOR DETERMINING RECREATIONAL WATER QUALITY CRITERIA,
Lockheed Missiles and Space Inc., Sunnyvale, Calif.
R. H. Dudley, K. K. Hekimian, and B. J. Mechalas.
Journal of the Water Pollution Control Federation, Vol. 48, No. 12, p 2761-2777, December 1976. 6 fig, 10 tab, 23 ref.

Descriptors: *Water quality control, *Salmonella, *Recreation, Risks, Data collections, Histograms, Coliforms, Mathematical models, Systems analysis, *Water quality standards.
Identifiers: Dose.

The development and application of a scientific methodology to evaluate risk to water recreationists as a function of each independent environmental factor is described. A mathematical model was developed to assess the risk of ill effect to a recreationist entering or using a body of water having a given hazard distribution. Herein, the incorporation of all relevant published data into the methodology using the factor Salmonella as an example is illustrated. That is, the study correlates all known published: (1) dose-response data for Salmonella; (2) measurements of Salmonella in water; and (3) estimates of risk of illness as a function of Salmonella in water. The result is a curve of the quantitative risk to the recreationist as a function of the two Salmonella subfactor criteria. (Bell-Cornell)
W77-04011

FORECASTINGS A LINE OF INVESTIGATIONS OF MEMBER COUNTRIES OF THE COUNCIL OF MUTUAL ECONOMIC ASSISTANCE IN THE AREA OF ENVIRONMENTAL HYGIENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
G. I. Sidorenko, E. K. Strizhak, and N. A. Rakhmanina.
Gig Sanit 9, p 86-90, 1975.

Descriptors: *Forecasting, *Public health, Cities, Rural areas, Population, *Environmental effects, *Air pollution, *Water pollution, Water supply, Soils, Microorganisms, Foreign countries.

Hygienic forecasting is gaining importance in connection with the development of cities and populated rural areas and increase of environmental pollution. A 1971 agreement on scientific and technical collaboration among member countries of the Council of Mutual Economic Assistance calls for joint studies of environmental protection, air quality in populated areas, water supply quality of populated areas, soil quality, noise and microbial pollution. Developments in these areas of investigation are forecast to the year 1990.--Copyright 1976, Biological Abstracts, Inc.
W77-04016

NONPOINT SOURCES OF POLLUTION: A FEDERAL PERSPECTIVE,
Environmental Protection Agency, Washington, D. C. Div. of Water Planning.
M. A. Pisano.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 102, No. EE3, Proceedings paper 12211, p 555-565, June 1976. 3 tab.

Descriptors: *Water pollution control, *Water quality, *Runoff, *Sedimentation, *Land use, *Silts, *Storm drains, Hydrology, Irrigation, Sediments, Mining, Natural resources, Conservation, Water resources, Legislation, Federal government, Planning.

The magnitude of the nonpoint source problem nationwide calls for the establishment of State, local, and Federal measures to control existing sources

and to prevent future stream degradation from additional nonpoint sources. Under the Environmental Protection Agency's (EPA) regulations, State and local water quality management agencies have the major responsibility for the planning and implementation of nonpoint source programs. Emphasis of nonpoint source control programs will be on preventative techniques which are referred to as 'Best Management Practices' in EPA regulations and guidelines. The EPA will provide guidance and technical assistance to the States and local designated agencies. Federal agencies will be encouraged to incorporate 208 objectives into their planning processes and to provide technical assistance to other agencies. Coordinated planning and implementation of nonpoint source programs at all governmental levels should result in significant water quality improvements. (Bell-Cornell)
W77-04017

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
For primary bibliographic entry see Field 5D.
W77-04019

PREFERENCE MODELS OF ENVIRONMENTAL IMPACT,
For primary bibliographic entry see Field 6G.
W77-04020

DEMONSTRATION OF A STATE WATER QUALITY MANAGEMENT INFORMATION SYSTEM,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
Available from GPO Sup Doc as EPI 23/3:600/574-002. $2.05; Microfiche from NTIS as PB-237 282. EPA 600/5-74-022, Socioeconmic Environmental Studies Series, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., August 1974. 129 p, 45 fig, 10 tab.

Descriptors: *Water quality, *Management, *Pennsylvania, *Data collections, costs, Operations, Manpower, Estimating.
Identifiers: *Information systems.

This report is a documentation of the Pennsylvania Water Quality Management Information System (WAMIS). Presented first is a program manager's overview of the system, wherein he discusses the system objectives and development, describes the operations of the various system modules (including required inputs and outputs as well as uses to wich the system may be put), estimates manpower and operating cost requirements, and summarizes methods for system application. Presented next is a compilation of elememts required for system application. Included is detailed documentation of elements required to apply the existing three system modules--the Facility Status, Water Quality, and Contact Modules. Given are system inputs with detailed coding instructions, sample output reports, and documentation of each of three system modules. Module documentation is comprised of system inputs and outputs, system flowcharts, system books, control procedures, clerical procedures, operator's instructions, and all program books. Sufficient information is provided to enable application of WANIS modules by other states or jurisdictions. (Bell-Cornell)
W77-04021

EXPERIMENTAL AND FIELD STUDIES IN HYGIENIC ASSESSMENT OF DRINKING WATER CONTAINING BORON, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
G. V. Verbitskaya.
Gig Sanit 7, p 49-53, 1975.

Descriptors: Public health, *Potable water, Metabolism, *Boron, *Trace elements, Lethal limit, *Water quality standards.

This trace-element had no cumulative properties and affected mainly the functional state of the rabbit parenchymatous organs, the carbohydrate metabolism and certain enzymic systems. The ineffective concentration of boron in water is suggested as a level of 0.5 mg/l.--Copyright 1976, Biological Abstracts, Inc.
W77-04033

NITROGEN AND PHOSPHOROUS REMOVAL FROM LAKES BY FISH HARVEST,
British Columbia Dept. of Recreation and Conservation, Penticton. Fish and Wildlife Branch.
C. J. Bull, and W. C. McKay.
Journal of the Fisheries Research Board of Canada, Vol. 33, p. 1374-1376, 1976, 2 tab., 14 ref.

Descriptors: *Phosphorous, *Nitrogen, *Eutrophication, *Lakes, *Nutrients, *Primary productivity, *Fish harvest, *Water pollution control, *Pollution abatement, Aquatic productivity, Nutrient removal.

Phosphorous (P) made up 0.3-0.5% of the wet weight of four species of fish. Nitrogen (N) accounted for a further 2.4-2.9%. If the maximum annual yield of fish was harvested from the lakes studied, less than 1% of the phosphorous and nitrogen entering the lake would be removed. On the basis of our data fish harvest would apparently not significantly slow nor reverse the process of eutrophication. (Katz)
W77-04035

INVESTIGATIONS ON THE INFLUENCE OF SALT CONCENTRATION ON THE ACTIVITY OF BACTERIAL POPULATIONS FROM FRESH AND WASTE WATERS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 5C.
W77-04065

ROLE OF POPULATIONS OF PLUMATELLA FUNGOSA (PALLAS) (BRYOZOA, PHYLACTOLEMA) IN THE SELF-PURIFICATION OF A POND AND A STREAM, (IN FRENCH),
Liege Univ. (Belgium). Laboratories de Morphologie, de Systematique et d'Ecologie Animales.
P. Job.
Hydrobiologia 48(3), p 257-261, 1976.

Descriptors: *Self purification, Ponds, Organic matter, Streams, Water pollution.
Identifiers: Bryozoa, *Phylactolema, *Plumatella-fungosa.

A very dense population of P. fungosa was observed in a pond and its outlet, polluted by organic matter from sewers. These organisms play a prominent part in the process of water purification; they can absorb annually an average quantity of 113 kg N/ha in zones where the biomass of the colonies reaches 15.6 tons/ha. There is a relation between the evolution of the biological quality of water, classified according to the Kolk-witz-Marsson system, and the localization and density of the Bryozoa populations. The greatest development was observed between the alfa mesosaprobic and beta mesosaprobic zones.--Copyright 1976, Biological Abstracts, Inc.
W77-04083

BACTERIOLOGICAL CHARACTERISTICS OF THE COAST WATERS IN THE DISTRICT OF CATANIA (ITALY), (IN ITALIAN),
Catania Univ. (Italy).
G. Nicoletti, G. Leonardi, and S. Marraro.
Ann Sclavo 17(3), p 283-298, 1975.

Descriptors: Coasts, *Water quality, Swimming, Europe.
Identifiers: *Bacteriological studies, *Catania(Italy), *Italy.

Water quality on the coast of Catania, Italy, is satisfactory for sea-bathing.--Copyright 1976, Biological Abstracts, Inc.
W77-04084

STUDY ON THE PURIFICATION OF SEWAGE WATER IN SOILS OF WESTERN SIBERIA, (IN RUSSIAN),
E. M. Lemeshkina, and M. S. Rodionova.
Pochvovedenie 3, p 88-91, 1976.

Descriptors: *Sewage, Biochemistry, Irrigation, *Water purification, Soils, Seasonal, Water temperature, Water pollution, Waste water treatment.
Identifiers: Siberia, *USSR.

The chemical composition of sewage water used for year-round irrigation and the biochemical processes occurring during their purification in the soil were studied in Western Siberia (USSR). Experiments with gray forest soil indicated that the biochemical processes were affected by the temperature of the water, soil and air, and that these processes were more intensive in the summer than in the fall. A 4 day period between irrigations did not ensure the necessary level of water purification, while a 5 day interval resulted in water purification even when the maximum permissible norm of water volume was used.--Copyright 1976, Biological Abstracts, Inc.
W77-04090

THE DETECTION OF AEROMONADS OF THE HYDROPHILA-PUNCTATA-GROUP, IN THE HYGIENIC ANALYSIS OF DRINKING WATER, (IN GERMAN),
Frankfurt Univ. (West Germany). Hygiene-Institut.
For primary bibliographic entry see Field 5A.
W77-04092

MICROBIOLOGICAL CHARACTERISTICS OF THE ROS/ RIVER AND SOME OF ITS TRIBUTARIES, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W77-04093

BDELOVIBRIO BACTERIOVORUS AS A FACTOR OF THE SELF-PURIFICATION OF RIVER WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Pushchino. Inst. of Biochemistry and Physiology of Microorganisms.
N. A. Chuvil'Skaya, L. A. Ledova, L. G. Churkina, and V. A. Lambina.
Gig Sanit 2, p 10-13, 1976.

Descriptors: *Bacteria, *Viruses, *Microorganisms, *Water temperature, Water purification, Rivers, *Self purification.
Identifiers: *Bdellovibrio-bacteriovorus, Russian-SFSR, *USSR, *Oka River(USSR).

B. bacteriovorus multiplication and bacteriolytic activities depend on the total number of microorganisms present and on the water temperature. In summer at an average river water temperature of 23.6C, B. bacteriovorus took an active part in the purification of the Oka river (Russian, SFSR, USSR) and caused a significant decrease in the number of microorganisms.--Copyright 1976, Biological Abstracts, Inc.
W77-04095

HYGIENIC ASPECTS OF PROTECTION OF WATER RESOURCES IN THE LIGHT OF THE RESOLUTION BY THE CENTRAL COMMITTEE OF THE COMMUNIST PARTY OF THE SOVIET UNION AND THE COUNCIL OF MINISTERS ON 'MEANS OF PREVENTING POLLUTION OF THE VOLGA AND URAL RIVER BASINS BY UNTREATED SEWAGE', (IN RUSSIAN),
K. I. Akulov.
Gig Sanit 2, p 3-7, 1976.

Descriptors: *Public health, *Water pollution, *Water quality standards, Water resources, Rivers, *Sewage, Reservoirs, Treatment facilities.
Identifiers: Allergy, Carcinogenesis, *USSR, *Volga River, *Ural River.

Soviet achievements in hygienic standardization, studies of the effects of harmful substances on the body (carcinogenesis, allergy) and its reproductive function, and prevention of water reservoir pollution by industrial sewage are outlined. Animal production complexes represent a potential epidemiologic threat. Future plans include preventive sanitary control of water resources, correction of sanitary control zones of water pipes, creation of a system to control, supervise and study the condition of water reservoirs, and incorporation into urban planning of reservoirs and sewage plants to allow for urban growth. The resolution stipulates complete cessation by 1980 of dumping of untreated household and industrial wastes into the Volga and Ural river basins (Russian SFSR, USSR).--Copyright 1976, Biological Abstracts, Inc.
W77-04096

COMPARATIVE INVESTIGATIONS ON THE SELF-PURIFICATION IN POLLUTED WATERS OF DIFFERENT SALINITIES, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
C. Schmutzer, and G. Rheinheimer.
Kiel Meeresforsch 31(1), p 17-25, 1975.

Descriptors: *Self purification, Bacteria, Nitrification, *Sewage, *Salinity.
Identifiers: West Germany, *Baltic Sea.

Breakdown of household sewage in fresh water and Baltic sea water was compared to determine the effect of salinity. This process at the beginning is no slower in Baltic Sea water than in fresh water. After 3-4 days a slackening occurs, mainly a slowdown of nitrification, possibly caused by the greater decline of sewage and fresh water bacteria in brackish water. The bactericidal effect is insignificant at the beginning due to the high nutrient concentration, and becomes noticeable only after a few days with the decrease in nutrients. During the initial phase the salinity of the Baltic Sea water in vitro seems to enhance the breakdown processes; perhaps the higher osmotic value plays a role. At the sewage outlet from the city of Kiel at Buelk (W Germany), the power of self-purification of the brackish water is sufficiently great to allow utilization of coastal waters as a drainage outlet rather than nearby inland waters.--Copyright 1976, Biological Abstracts, Inc.
W77-04098

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT. SPECIAL REPORT I: WATER QUALITY MODELLING AND MANAGEMENT STUDIES FOR CORPUS CHRISTI BAY: A LARGE SYSTEM APPROACH,
Texas Univ., at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 5B.
W77-03898

ECONOMIC MODELING FOR WATER POLICY EVALUATION.
North-Holland/TIMS Studies in the Management Sciences, Volume 3, North-Holland/American Elsevier, New York, N.Y., 1976. 261 p, 32 fig, 19 tab, 234 ref. R. M. Thrall, et al., Eds.

Descriptors: *Water resources development, *Water policy, *Economics, *Mathematical models, *Optimization, Water quality control, Evaluation, Analytical techniques, Linear programming, Dynamic programming, Simulation analysis, Management, Decision making, Planning, Projects, Social aspects, Industries, Agriculture, River basins, Environment, Systems analysis.
Identifiers: Cost minimization.

Presented is a set of papers selected from a series of four sessions on Economic Modeling for Water Policy Evaluation at the 1974 TIMS/ORSA meeting in San Juan Puerto Rico. The emphasis throughout is upon model development and utilization and a variety of water resources development problems are addressed. The first two papers provide a historical background of water resources modeling and a review of the current status of modeling efforts; unsolved problems are elucidated. The following three papers are devoted to water-related models applied to industry and agriculture. Next, seven papers contribute to the field of modeling methodology, with reference to some use of water. Considered are: time phasing and scale in water projects, accounting for the importance of their physical setting; marketing of effluent emission rights by river basin authorities as a regulatory mechanism; incorporation of recreational factors into water management models; the pulp and paper industry as a basis for comparing the merits of linear and mixed integer programming models; approaches to resource management which embody interactions between modeler and decision maker; and the problem of pricing the commons, examined in the context of a common aquifer or surface water supply, or fishing ground. These articles are then followed by eight very brief papers in the nature of editorial comments, coming from a panel discussion on forward-looking views on water use. Among the topics considered is present shortcomings of systems analysis as applied to water resources planning and management. (See W77-03925 and W77-03936) (Bell-Cornell)
W77-03924

WATER RESOURCE MODELS: A HISTORICAL SUMMARY,
New Mexico Univ., Albuquerque.
N. Wollman.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 1-20. 32 ref.

Descriptors: Water resources, *Mathematical models, *History, *Economics, Water quality, Water supply, Water treatment, Comprehensive planning, Environment, Water policy, Optimization, Simulation analysis, Systems analysis.
Identifiers: Cost minimization, Benefit maximization.

This review of water resource models pays special attention to national and regional models and covers the quarter century beginning with the report of the President's Water Resources Policy Commission of 1950. The summary includes work of the Senate Select Committee on National Water Resources, the National Water Commission, the North Atlantic Regional Water Resources Study Coordinating Committee, and selected contributions of academic, governmental, and research organizations to simulation and optimization models. Discussed are the University of Colorado economic model and Resources For the Future's Delaware Estuary model. Growth in complexity of models is apparent as well as movement toward multi-objective, multi-regional, and multi-media equilibrium solutions. Efforts are underway to identify optimum combinations of production processes, treatment of residuals, quality of environment, and mix of goods and services. Impressive progress has been achieved in developing new tools and in generating new data. However, we still lack capability of reaching optimal or general equilibrium solutions even under static conditions, with even less capability for satisfactory solution of transitional sequences and tracing of macroeconomic effects. (See also W77-03924) (Bell-Cornell)
W77-03925

MODELING AND INFORMATION HANDLING IN ENVIRONMENTAL SCIENCE,
American Univ., Washington, D. C. Coll. of Public Affairs.
For primary bibliographic entry see Field 5G.
W77-03926

MODELS OF AGRICULTURAL WATER, LAND USE AND THE ENVIRONMENT,
Iowa State Univ., Ames.
E. O. Heady, and K. J. Nicol.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 29-56. 10 fig, 4 tab, 6 ref. 1 append.

Descriptors: *Water resources development, *Water allocation(Policy), *Agriculture, *Water demand, *Linear programming, *Model studies, *Land use, Environment, Regions, Irrigation, Optimization, Economics, Water supply constraints, Alternative planning, Evaluation, Systems analysis.
Identifiers: *Cost minimization, *Food production, *Soil loss, Interregional, Water use coefficients.

This article considers a series of large-scale models relating to water allocation, land use, interregional allocation of food production, and environmental quality restraints and agricultural policy. These comprehensive, linear programming models are still in the development stage and are utilized to determine least cost agricultural production alternatives. Two of these models, developed to analyze water allocation and demand in interaction with parallel variables for land, are summarized in detail. These analyses are made in relation to parameters of varying magnitude for population, export and domestic food demand, technological inputs, environmental restraints, agricultural supply control policies, and exogenous urban industrial uses. The first model discussed emphasizes water; the second model is an extension of the first to include soil loss, a variable of major environmental consequences in the agricultural sector. Results indicate that increases in water price have a more important effect on water use in the 17 Western States than does change in numerous other parameters. The National soil loss total and average loss per acre by land resource groups for five alternatives of soil loss restriction are given. (See also W77-03924) (Bell-Cornell)
W77-03927

NATIONAL ECONOMIC MODELS OF INDUSTRIAL WATER USE AND WASTE TREATMENT,
Houston Univ., Tex.
For primary bibliographic entry see Field 5D.
W77-03928

GROUND WATER MANAGEMENT AND SURFACE WATER DEVELOPMENT FOR IRRIGATION,
Montana State Univ., Bozeman.
For primary bibliographic entry see Field 4B.
W77-03929

COORDINATING SCALE AND SEQUENCING DECISIONS FOR WATER RESOURCES PROJECTS,
California Univ., Los Angeles.
D. Erlenkotter.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland American Elsevier, New York, N.Y., 1976, p 97-112. 1 fig, 3 tab, 27 ref.

Descriptors: *Water resources development, *Projects, *Timing, *Planning, *Dynamic programming, Coordination, Decision making, River basins, Analytical techniques, Costs, Benefits, Optimization, Mathematical models, Systems analysis.
Identifiers: *Sequencing, Cost minimization, *Project scale.

The development of water resources leads to decisions involving the selection, scale, and time-phasing of various water projects. Water resources projects tend to be uniquely characterized by their physical setting and once developed, changes in project scale are difficult or impossible. Thus both the scale and sequence in which water projects are undertaken are of great importance. Scale is often determined in a static context, while sequencing is examined under the presumption that the sizes of individual projects are already specified. After tracing briefly the evolution of approaches for planning development of water resources, the close interrelationship between scale and sequencing decisions for water resources projects is demonstrated using simple modeling techniques. Employed is dynamic programming to minimize the costs of project operations. The modeling shows the complexity of determining water resources development decisions in a more general framework; economies of scale for individual projects lead to intractable nonconvex programming problems even if sequencing is given, while the sequencing decision itself is a difficult combinatorial problem. (See also W77-03924) (Bell-Cornell)
W77-03930

WATER QUALITY MANAGEMENT AND THE DISTRIBUTION OF EMISSION RIGHTS BY SEALED TENDER MARKETS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03931

INCORPORATING OUTDOOR RECREATION IN A MODEL OF STREAM FLOW REGULATION AND WATER QUALITY IMPROVEMENT,
Technion-Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 5G.
W77-03932

MODELING PROCESS SUBSTITUTIONS BY LP AND MIP,
Resources for the Future, Inc., Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03933

TWO METHODS FOR ADDING INFORMATION TO THE RESOURCES MANAGEMENT PROCESS,
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6B.
W77-03935

QUASI-PUBLIC GOODS: PRICING THE COMMONS,
Ohio State Univ., Columbus.
R. A. Tybout.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., 1976, p 211-236. 1 fig, 10 ref.

Descriptors: *Water resources, *Natural resources, *Pricing, *Economic efficiency, Pollution abatement, Fisheries, Graphical analysis, Analytical techniques, Marginal costs, Optimization, Transportation, Recreation, Industries, Constraints, Standards, Mathematical models, Systems analysis.
Identifiers: The commons, *Congestion, *Quasi-public goods, Externalities, Household sector, Lagrangean maximization.

The problem of the commons appears in many forms, such as exploitation of a common aquifer. Congestion is a problem of the commons, and this fact plays an important role in the analysis presented herein. Congestion in the use of natural areas or man-made facilities can interfere with economic optimization. This paper proposes a general framwork for efficient pricing of the commons and considers the cases of natural resources and congestion. Externalities in the allocation of space are the cause of congestion just as externalities in the exploitation of natural resources are the cause of conventional commons problems. The proposed framwork is shown to be consistent with some contributions extant in received theory but in conflict with others. The concept of quasi-public goods is introduced to distingish the unifying characteristic of the commons from other pricing problems. The three classes of goods -- private, public and quasi-public -- are found to be qualitatively distinct. A final analysis deals with the externalities of pollution. It is shown that there are no quasi-public goods in the case of pollution, only public and private goods. A fish harvesting modes is used to illustrate the case of resource exploitation. Derived is a social optimum for the collective; Lagrangean maximization is used to find the marginal conditions of welfare maximization for the collective.. In the case of congestion, examples are considered in transportation and recreation. The pollution case deals with interindustry effects, the household sector, and standards. (See also W77-03924) (Bell-Cornell)
W77-03936

MULTILEVEL INCREMENTAL DYNAMIC PROGRAMING,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
P. Nopmongcol, and A. J. Askew.
Water Resources Research, Vol. 12, No. 6, p 1291-1297, December 1976. 7 fig, 1 tab, 10 ref.

Descriptors: *Water resources, *Dynamic programming, *Optimization, Computer models, Methodology, Reservoirs, Equations, Systems analysis.

An approach to the solution of multidimensional dynamic programs is presented which differs from most decomposition methods currently used in optimization of water resources systems. The basic concept is directly dependent upon certain characteristics of incremental dynamic programming (IDP). The new technique presented herein is called multilevel incremental dynamic programming (MIDP). It provides a marked reduction in computer time and permits high-dimensional deterministic pmiroblems to be handled with far greater ease than has been previously possible. The technique take advantage of certain characteristics of invertible systems, but may be easily extended to noninvertible systems. The MIDP method increases the power of IDP as a tool in the optimization of multidimensional deterministic systems. An example of application of MIDP to a hypothetical 4-reservoir system is studied. (Bell-Cornell)
W77-03937

OPTIMAL LONG-TERM CONTROL OF A MULTIPURPOSE RESERVOIR WITH INDIRECT USERS,
Institut za Vodoprivredu Jaroslav Cerni, Belgrad (Yugoslavia).
S. Opricovic, and B. Djordjevic.
Water Resource Research, Vol. 12, No. 6, p 1286-1290, December 1976. 3 fig, 9 ref.

Descriptors: *Multiple-purpose reservoirs, *Control, *Dynamic programming, *Water storage, *Water allocation(Policy), *Algorithms, Optimization, Water distribution(Applied), Irrigation, Water shortage, Efficiencies, Equations, Mathematical models, Operations research.
Identifiers: *Vardar basin(Yugoslavia), Water users.

A dynamic programming, three-level algorithm has been developed in order to solve certain problems in the practical design of multipurpose reservoirs in the Vardar basin in Yugoslavia. The basin in an area of water deficit, and a big rise in water comsumption in both the Yugoslav and Greek portions of the reservoir is envisaged for the future. Described is the algorithm used for the optimal control of a multipurpose reservoir with direct and indirect users. (Indirect users, such as irrigators, are those who reuse water after some direct user, e.g., hydroelectric plants). The first level optimizes the distribution of available water among time intervals; the second level allocates water to direct users in one time interval. At the third level, water already used by direct users is allocated to indirect users further downstream. Dynamic programming is employed at all three levels, but the recurrence relations are dt eveloped in accordance with the decomposition of the control problem. Optimization criteria, and results, are most efficient water storages and allocation of water to all users, and consideration of energy production over a 20-year period. Statistical analysis of the results yields a graph of the probability of optimal water levels in a reservoir during a year, which represents the optimum long-term control policy. (Bell-Cornell)
W77-03938

RELIABILITY, TRADE-OFFS, AND WATER RESOURCES DEVELOPMENT MODELING WITH MULTIPLE CROPS,
New South Wales Univ., Kensington (Australia). School of Economics.
N. J. Dudley, D. M. Reklis, and O. R. Burt.
Water Resources Research, Vol. 12, No. 6, p 1101-1108, Devember 1976. 5 fig, 1 tab, 11 ref.

Descriptors: *Irrigation efficiency, *Water resources development, *Water management(Applied), *Planning, *Optimization, *Economic efficiency, *Decision making, *Reliability, Downstream, Crops, Water supply, Benefits, Summer, Inflow, Water utilzation, Linear programming, Dynamic programming, Simulation analysis, Reservoir storage, Reservoir releases, Water allocation(Policy), Montana, Design, Estimating, Equations, Mathematical models, Computer models, Systems analysis.
Identifiers: *Benefit maximization, Higher latitudes.

A hierarchy of models, structured to maximize expected benefits, is developed to aid mangement and planning decisions in multicrop water resources systems located in higher latitudes of the world and featuring significant downstream requirements. A major objective is to quantify tradeoffs between systems with a high reliability of water supply but low average benefits and those of low reliability with high average but also highly variable returns. Linear programming is used to select the best crop combinations for given quanti-

ties of water available over the summer, associated water usage, and revenue estimates. A simulation model predicts changes in reservoir storage resulting from inflows and releases to meet requirements of crops selected by the linear program. Interseasonal water allocation is then optimized by using dynamic programming. A method is presented for determining variance of benefits as a function of system design parameters and downstream requirements. In an application to a water resources system in Montana, downstream water requirements and penalties were found to have a large effect on high reliability-low reliability tradeoffs. With zero downstream water requirements, there was not tradeoff between expected benefits and variance of benefits as acreage developed for irrigation increased. (Bell-Cornell)
W77-03939

MODEL UNCERTAINTY IN FLOOD FREQUENCY ANALYSIS AND FREQUENCY-BASED DESIGN,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W77-03940

OPTIMIZATION OF CROP IRRIGATION STRATEGY UNDER A STOCHASTIC WEATHER REGIME: A SIMULATION STUDY,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 3F.
W77-03941

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, SEVENTH VOLUME.
Office of Water Research and Technology, Washington, D. C.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 191, Price codes: A17 in paper copy, A01 in microfiche. Water Resources Scientific Information Center, Report OWRT/WRSIC 76-201, November 1976, 390 p. Edited by Daniel P. Loucks

Descriptors: *Water resources development, *Bibliographies, *Computer models, Cost analysis, Economics, *Linear programming, Management, *Mathematical models, Model studies, *Optimization, Planning, Reservoir operation, Simulation analysis, Stochastic processes, *Systems analysis, Water quality, Water supply.

This is an annotated bibliography of 248 selected publications issued in 1974 and 1975 pertaining to the application of systems analysis techniques for defining and evaluating alternative solutions to water resource problems. The first two volumes of this bibliography, having the same title, were published by the Cornell University Water Resources and Marine Sciences Center, Ithaca, New York (Publication 25, August 1969; Publication 35, June 1971); the third, fourth, fifth, and sixth volumes were published by the Water Resources Scientific Information Center in December 1972, December 1973, July 1974, and September 1975, respectively. Both subject and author indexes are provided. Descriptors are listed with each abstract. The abstracted material emphasizes the application of optimization and simulation techniques for assisting in the planning and management of water resource systems. (See also W76-01517; W74-11574; W74-05401; W73-07428; W71-09465 and W70-00506)
W77-03967

LEAST COST CONTROL STRATEGIES IN URBAN DRAINAGE DESIGN -- A DYNAMIC PROGRAMMING APPROACH,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W77-04007

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
For primary bibliographic entry see Field 2L.
W77-04008

APPLICATION OF GAME THEORY IN WATER MANAGEMENT,
Water Resources Center, Budapest (Hungary).
I. Bogardi, and F. Szidarovszky.
Applied Mathematical Modelling, Vol. 1, No. 1, p 16-20, June 1976. 1 fig, 1 tab, 23 ref.

Descriptors: *Water management(Applied), *Water resources, *Decision making, *Water quality control, Optimization, Environmental control, Economics Irrigation systems, Regional development, Costs, Benefits, Algorithms, Equations, Mathematical models, Systems analysis.
Identifiers: *Game theory, *Oligopol game.

To date, game theoretical principles have been used where other programming methods have failed in the design of complex water management systems. In this sense, the optimum strategy for water resources development in an international river basin can be determined by using game theory with due allowance to the various technical, economic and social conditions of the countries involved. Under such complex conditions, game theory primarily promotes the formulation of the problem and the practical solution simplifies the method to a linear programming algorithm. A general evaluation of work concerning applied game theory in water quality management shows that, though a number of workers have realized the potentialities of game theory for decision analysis, methods for its broad applicability are still lacking. This paper focuses on practical applications and introduces possible uses of the oligopol game in water management. Important areas of water management are shown where the form of typical goal functions permits the use of methods elaborated for oligopol games. A detailed application of the method to regional water quality management is presented where the objective is to determine least cost and greatest benefit alternatives. (Bell-Cornell)
W77-04009

PHYSICAL AND ECONOMIC PARAMETERS FOR PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-04010

DETERMINING WATERSHED SUB-AREAS WITH PRINCIPAL COMPONENT ANALYSIS,
Tobacco Tax Council, Richmond, Va.
For primary bibliographic entry see Field 4D.
W77-04012

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
For primary bibliographic entry see Field 5D.
W77-04019

PREFERENCE MODELS OF ENVIRONMENTAL IMPACT,
For primary bibliographic entry see Field 6G.
W77-04020

6B. Evaluation Process

THE CALIFORNIA COASTAL PLAN (A SYMPOSIUM).
For primary bibliographic entry see Field 6E.
W77-03688

COASTAL ZONE MANAGEMENT IN FLORIDA,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03699

THE PROJECTED ECONOMIC IMPACT OF THE RICHARD B. RUSSELL DAM AND LAKE UPON SOUTH CAROLINA,
Clemson Univ., S. C. Dept. of Agricultural Economics and Rural Sociology.
J. M. Stepp, J. B. London, and P. C. Luisa.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 014, Price codes: A05 in paper copy, A01 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report Number 60, February 1976. 93 p, 2 fig, 6 tab, 28 ref. S-000-SC.

Descriptors: *Water resources development, *Economic impact, Cost-benefit analysis, *Regional analysis, *South Carolina, Lakes, Dams, *Pre-impoundment, *Environmental effects, *Projections, Benefits, *Project benefits, Project planning.
Identifiers: *Savannah River(SC), Richard B. Russell Dam(SC).

This report is based upon a reconnaisance (rather than in-depth) study of the projected economic and environmental effects upon South Carolina of a proposed U. S. Army Corps of Engineers project on the Savannah River, which constitutes the boundary between Georgia and South Carolina. Beneficial and adverse effects of the project upon South Carolina are identified, described and, where possible, quantified. The purpose was to provide, as requested, information and recommendations for the use of South Carolina public officials and private organizations in deciding whether to support, oppose, and/or seek modifications of the project. The quantifiable annual benefits to South Carolinians from the project as currently designed were estimated to be 1.75 times as high as the quantifiable costs to South Carolinians, but it was concluded that a very large proportion of the net benefits would be cancelled by unquantified adverse environmental effects. Several suggestions are made for project changes which would increase the benefits and reduce the adverse effects.
W77-03735

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
For primary bibliographic entry see Field 6F.
W77-03774

WATER PROBLEMS IN THE COLORADO RIVER BASIN: LEGAL AND INSTITUTIONAL FRAMEWORK,
Economic Research Service, Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-03830

WATER AVAILABILITY, QUALITY, AND USE IN ALASKA.
Geological Survey, Anchorage, Alaska.
G. O. Balding.
Open-file report 76-513, August 1976. 236 p, 86 fig, 42 tab, 147 ref.

Descriptors: *Available water, *Surface waters, *Groundwater resources, *Water quality, *Alaska, Streamflow, Flow rates, Flood discharge, Flood frequency, Water wells, Water yield, Hydrologic data, Chemical analysis, Water utilization.

The Alaska Water Assessment, sponsored by the Water Resources Council, is a specific problem analysis for Alaska of the National Assessment of

Water and Related Land Resources. The Alaska region has been divided into six hydrologic subregions and eighteen subareas. For each subarea, estimated mean annual runoff per square mile, suspended-sediment concentrations that can be expected during 'normal' summer runoff, flood magnitudes and frequencies, and ground-water yields are illustrated on maps. Tables show water quality of both ground water and surface water from selected wells and streams. Water use according to the type of use is discussed, and estimates are given for the amounts used. Water-use categories include domestic, irrigation, livestock, seafood processing, oil and gas development, petrochemical processing, pulp mills, hydroelectric, coal processing, steam electric, mineral processing, sand and gravel mining, and fish-hatchery operations. (Woodard-USGS)
W77-03883

ECONOMIC MODELING FOR WATER POLICY EVALUATION.
For primary bibliographic entry see Field 6A.
W77-03924

WATER RESOURCE MODELS: A HISTORICAL SUMMARY,
New Mexico Univ., Albuquerque.
For primary bibliographic entry see Field 6A.
W77-03925

COORDINATING SCALE AND SEQUENCING DECISIONS FOR WATER RESOURCES PROJECTS,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W77-03930

WATER QUALITY MANAGEMENT AND THE DISTRIBUTION OF EMISSION RIGHTS BY SEALED TENDER MARKETS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 5G.
W77-03931

INSTITUTIONS AND OBJECTIVES ON THE WATER, ENERGY, ENVIRONMENT INTERFACE,
Harvard Univ., Cambridge, Mass.
M. Roberts.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y., p 179-196, 1976. 50 ref.

Descriptors: *Water resources, *Decision making, *Quality control, *Economic aspects, *Social aspects, Environment, Energy, Water policy, Legislation, Cost-benefit analysis, Optimization, River basins, Planning, Dams, Recreation.

Without some agreement about what is to be studied, and how that is to be done, no discipline can make much scientific progress. Occasionally, someone must ask philosophically, 'What is the question.' In particular, what do the physical relationships among energy production, environmental quality and water use imply for how we should define such policy questions both institutionally and philosophically. In other words, do we want water agencies, energy agencies, or something else. And, how should we specify our objective function for policy purposes. Conventional answers are not fully satisfactory, since real systems are so complex; rather, the question is what kind of imperfection is most helpful in each particular context. From this perspective, the author criticizes the recently fashionable suggestion that we use residuals management as a basis for institutional arrangements. Characterized as non-operational and ethically unappealing are most economists' favorite formulation of social choice problems. Given is a suggestion for dealing with the problem of the social rate of discount. It is concluded that the continued growth of the energy sector will place steadily increasing demands on water resources, and so we therefore need more thought on how to define important policy questions. Problems of optimum river basin development are considered as examples. (See also W77-03924)(Bell-Corell)
W77-03934

TWO METHODS FOR ADDING INFORMATION TO THE RESOURCES MANAGEMENT PROCESS,
Office of Water Research and Technology, Washington, D. C.
T. G. Roefs.
In: Economic Modeling for Water Policy Evaluation (Ed. by Robert M. Thrall, et al.) North-Holland/TIMS Studies in the Management Sciences, Vol. 3, North-Holland/American Elsevier, New York, N.Y. p 197-210, 1976. 1 fig, 22 ref.

Descriptors: *Water resources, *Management, *Decision making, *Planning, *Methodology, *Social aspects, Estimating, Simulation analysis, Computer programs, Optimization, Linear programming, Systems analysis.
Identifiers: *Information system, *Multi-objective planning, *Social goals, Conflict resolution.

Two new approaches to the resource decision and management process are outlined. The first is an application of Management Information System concepts to information generated by the Planning process. A recursive access system based on national goals is employed. The system is essentially static in that alternative scenarios and problem solutions are predetermined. This process system, created by the thirteen western states, has had a trial application to river basin planning. The second approach is one which works toward a conflict resolution process: the process involvesfast access to simulation routines to estimate effects of decisions within a narrowly defined decision space. It shows more flexibility than the first approach but requires a more intense problem focus and greater information resources. (See also W77-03924) (Bell-Cornell)
W77-03935

MULTIPURPOSE DEVELOPMENT ON THE TISZA RIVER.
For primary bibliographic entry see Field 4A.
W77-03957

POLLUTION, WELFARE, AND ENVIRONMENTAL POLICY IN THE THEORY OF COMPARATIVE ADVANTAGE,
Northwestern Univ., Evanston, Ill. Center for Mathematical Studies in Economics and Management Science.
For primary bibliographic entry see Field 6G.
W77-03958

PUBLIC CHOICE AND URBAN WATER QUALITY,
Georgia Univ., Athens.
C. D. DeLorme, and N. J. Wood.
American Journal of Economics and Sociology, Vol. 35, No. 3, p. 225-233, 1976. 1 tab., 10 ref.

Descriptors: *Waste water treatment, *Comparative benefits, *Comparative costs, Economic efficiency, Resource allocation, Cities, Effluents, Federal Water Pollution Control Act, Estuaries, Biochemical oxygen demand.
Identifiers: *Zero discharge alternatives.

A goal of 90% biochemical oxygen demanding waste removal from effluents is explored as an alternative to the Federal Water Pollution Control Act goal of zero discharge for metropolitan areas located on large bodies of water. Based on a study of water quality in five Delaware estuaries, it is concluded that there is no significant improvement in water use or in water quality from increasing the waste removal level from 90 to 100% while meeting the higher standard would entail a significant marginal cost. The cost of providing secondary sewage treatment at 90% removal of oxygen demanding wastes from effluents discharged into these estuaries is estimated to be $.04 per pound, while removal of the last 10% of the waste would cost at least $2.00 per pound. A total of $317 million per year would be required to move from 90 to 100% removal in these estuaries, and a total of nearly $1 billion per year might be required to accommodate all similar urban areas in the U.S. Not only is the 100% removal cost high, but that approach fails to take advantage of the natural waste assimilative capabilities of large bodies of water. A 90% removal approach would not only be economically more efficient, but would leave scarce resources available for other social goods. (Luedtke-Wisconsin)
W77-03960

ESTIMATING NET BENEFITS OF RECREATION UNDER CONDITIONS OF EXCESS DEMAND,
Rhode Island Univ., Kingston. Dept. of Resource Economics.
For primary bibliographic entry see Field 6D.
W77-03964

APPLICATION OF GAME THEORY IN WATER MANAGEMENT,
Water Resources Center, Budapest (Hungary).
For primary bibliographic entry see Field 6A.
W77-04009

PHYSICAL AND ECONOMIC PARAMETERS FOR PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
North Dakota State Univ., Fargo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W77-04010

A SCIENTIFIC BASIS FOR DETERMINING RECREATIONAL WATER QUALITY CRITERIA,
Lockheed Missiles and Space Inc., Sunnyvale, Calif.
For primary bibliographic entry see Field 5G.
W77-04011

DETERMINING WATERSHED SUB-AREAS WITH PRINCIPAL COMPONENT ANALYSIS,
Tobacco Tax Council, Richmond, Va.
For primary bibliographic entry see Field 4D.
W77-04012

SOCIAL WELL-BEING AND WATER RESOURCES PLANNING,
Office of Water Research and Technology, Washington, D.C.
L. R. Brown.
Water Resources Bulletin, Vol. 12, No. 6, p 1181-1190, December 1976. 3 fig, 9 ref.

Descriptors: *Water resources development, *Planning, *Social aspects, Cost-benefit analysis, Economics, Evaluation, Aesthetics.
Identifiers: *Social impact analysis, *Social well-being, Multi-objective planning.

For many years, Federal water resources projects have been subjected to benefit-cost analysis to establish their economic feasibility. Several years ago, social well-being was added as a consideration, and since then it has come to the forefront of water resources development planning. This paper discusses the state-of-the-art in analyzing and evaluating aspects of social well-being. It stresses

shortcomings and advocates a direction for further efforts. Considered are the goal structure of economic opportunity and that of aesthetic opportunity. Given is a hypothetical social profile, including such topics as education, welfare, health, and law and justice. It is concluded that social indicators must be streamlined down to more manageable proportions. (Bell-Cornell)
W77-04013

DEMONSTRATION OF A STATE WATER QUALITY MANAGEMENT INFORMATION SYSTEM,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
For primary bibliographic entry see Field 5G.
W77-04021

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

A SURVEY OF PULP AND PAPER INDUSTRY ENVIRONMENTAL PROTECTION EXPENDITURES AND OPERATING COSTS - 1975,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W77-03807

A NOTE ON EFFLUENT CHARGES AND MARKET STRUCTURE,
State Univ. of New York at Binghamton. Economic Growth Inst.
For primary bibliographic entry see Field 5G.
W77-03955

EFFLUENT CHARGES AND LICENSES UNDER UNCERTAINTY,
Harvard Univ., Cambridge, Mass. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-03959

EXAMINATION OF ENVIRONMENTAL POLICIES USING PRODUCTION AND POLLUTION MICROPARAMETER DISTRIBUTIONS,
Tel-Aviv Univ. (Israel). Foerder Inst. for Economic Research.
For primary bibliographic entry see Field 6G.
W77-03961

THE SYMMETRY OF EFFLUENT CHARGES AND SUBSIDIES FOR POLLUTION CONTROL,
Toronto Univ. (Ontario). Inst. for Environmental Studies and Engineering.
For primary bibliographic entry see Field 5G.
W77-03962

TECHNICAL AND MICROECONOMIC ANALYSIS OF CADMIUM AND ITS COMPOUNDS,
Versar, Inc., Springfield, Va.
For primary bibliographic entry see Field 5B.
W77-03963

OPTIMUM EFFORT AND RENT DISTRIBUTION IN THE GULF OF MEXICO SHRIMP FISHERY,
Texas A and M Univ., College Station.
W. L. Griffin, R. D. Lacewell, and J. P. Nichols.
American Journal of Agricultural Economics, Vol. 58, No. 4, Part I, p 644-652, November 1976. 1 fig, 2 tab, 21 ref.

Descriptors: *Fisheries, *Shrimp, *Gulf of Mexico, *Rent, Distribution, Optimization, Costs, Management, Methodology, Ships, Mathematical models, Systems analysis, Equations.
Identifiers: *Rent maximization, Common property, Opportunity costs, *Economic optimum.

Traditional methods used to estimate fishing effort that maximizes rent to an open access resource have almost universally assumed all costs are directly proportional to effort. When crews receive a fixed share of gross returns, labor costs are proportional to catch; hence, rent acrues to crews as well as vessel owners under limited entry. A model that allows costs to be proportional to effort and catch has been applied to the Gulf of Mexico shrimp fishery. This study indicates that traditional analysis would result in management schemes that overtax vessels and ignore rent accruing to crews. Management schemes must be dynamic if they are going to be effective, since optimum effort rent to the resource is very sensitive to price changes. (Bell-Cornell)
W77-04014

THE INTEGRATION OF DESALINATION PLANT WITH EXISTING AUSTRALIAN WATER RESOURCES,
New South Wales Univ., Kensington (Australia). School of Nuclear Engineering.
For primary bibliographic entry see Field 3A.
W77-04018

6D. Water Demand

WATER RESOURCES OF EL PASO COUNTY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
R. K. Livingston, J. M. Klein, and D. L. Bingham.
Colorado Water Conservation Board, Denver, Colorado Water Resources Circular No 32, 1976. 85 p, 53 fig, 4 tab, 7 append.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Water demand, *Urbanization, Hydrologic data, Water quality, Gaging stations, Flow rates, Aquifer characteristics, Surface-groundwater relationships, Available water, Water utilization, Imported water, Projections, *Colorado.
Identifiers: El Paso County(Colo), Human population growth.

The rate of population growth in El Paso County, Colo., has been one of the fastest in the United States. Continued rapid population growth has been accompanied by a similar growth in demand for industrial and municipal water. The largest municipality in the county, Colorado Springs, imports more than one-half of its water from sources outside the county. Estimated water budgets for four drainage indicate that precipitation and evapotranspiration account for 82 to 100 percent of the water entering and leaving each basin. The county is drained by tributaries of both the South Platte and Arkansas Rivers--the Arkansas River basin draining about 95 percent of the county. The dissolved-solids concentration of water in the streams of the county is inversely related to streamflow. The addition of sewage effluent deteriorates the water quality of Fountain Creek. The principal alluvial aquifers are in Fountain Creek and Jimmy Camp Creek valleys, which contain an estimated 100,000 acre-feet of water in storage, and in the upper Black Squirrel Creek basin, which contains an estimated 350,000 acre-feet of water in storage. The dissolved-solids concentration of water from the alluvial aquifers range from about 250 to 3,690 mg/liter. The principal bedrock aquifer, the Dawson Formation contains an estimated 38 million acre-feet of water in the upper 500 feet of saturated thickness. In most areas the dissolved-solids concentration of ground water from the Dawson Formation is less than 500 mg/liter. The present water supply in El Paso County can be augmented primarily by future increased water imports from outside of the county and reuse of that water, and by increased use of ground water. (Woodard-USGS)
W77-03890

MODELS OF AGRICULTURAL WATER, LAND USE AND THE ENVIRONMENT,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 6A.
W77-03927

INCORPORATING OUTDOOR RECREATION IN A MODEL OF STREAM FLOW REGULATION AND WATER QUALITY IMPROVEMENT,
Technion-Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 5G.
W77-03932

ESTIMATING NET BENEFITS OF RECREATION UNDER CONDITIONS OF EXCESS DEMAND,
Rhode Island Univ., Kingston. Dept. of Resource Economics.
K. E. McConnell, and V. A. Duff.
Journal of Environmental Economics and Management, Vol. 2, No. 3, p. 224-230, 1976. 1 fig., 8 ref.

Descriptors: *Recreation demand, *Estimated benefits, *Elasticity of demand, Recreation, Recreation facilities, *Water demand, Prices, Economics, Market value, Estimating equations, Forecasting, Social aspects.
Identifiers: *Travel-cost method, Excess demand.

Examination is made of irregularities which arise in use of the travel-cost method of assessing the value of publicly operated recreation sites when excess demand for the use of facilities at a particular site leads to rationing of access. Because recreation facilities have traditionally been provided at a nominal price by the public sector, no market pricing mechanism has existed to allocate resources efficiently. As a surrogate estimation technique, price value has been commonly assessed by use of the travel-cost method, in which a demand curve for the facility is determined indirectly by assuming that travel and transfer costs measure the price of the recreational experience to the consumer. But this method underestimates a consumer surplus when there is excess demand at a facility. The underestimate arises because the demand function is more elastic with respect to travel costs than it is with respect to admission charges. Excess demand causes recreationists to have to incur travel and transfer costs to reach a recreation site with uncertainty about whether they will be admitted once they arrive. As a result, under conditions of excess site demand, per capita and total benefits are underestimated. A more accurate use of the travel-cost method with excess-demand sites where there is rationing would be to correct the slope of the estimated demand curve by a factor of Pi to the tenth exponential power. (Harris-Wisconsin)
W77-03964

6E. Water Law and Institutions

WATER POLLUTION CONTROL ADMINISTRATION, A MEMORANDUM REPORT ON A RECONNAISSANCE STUDY.
Public Administrative Service, Chicago, Ill.
For primary bibliographic entry see Field 5G.
W77-03684

LEGAL SYMPOSIUM ON WETLANDS: AN EXECUTIVE SUMMARY, NOVEMBER 1974,
Virginia Inst. of Marine Science, Gloucester Point.
R. D. Anderson, D. Garten, and T. Smolew.
Available from the National Technical Information Service, Springfield, VA 22161 as COM75-10899, Price codes: A02 in paper copy, A01 in microfiche. Report to NOAA Sea Grant Program, November, 1974. 8 p, 1 fig, 2 photo.

Descriptors: *Virginia, *Wetlands, *Conferences, *Coastal marshes, Tidal marshes, Salt marshes, Legislation, Marshes, Electric power industry, Industries, Compensation, Law enforcement, Water law, Administrative agencies, Shore protection, Coastal(Coasts), Fish harvest, Legal aspects.
Identifiers: *Coastal zone management.

The purpose of the wetland symposium was to examine the non-ecological aspects of wetlands. Particular emphasis was placed on the legal implications of wetlands. With approximately 95% of Virginia's annual fish harvest dependent on wetlands comprising only land a half percent of the total area of the state, wetlands are of enormous value. After emphasizing the economic importance of wetlands to the state, speaker at the symposium examined the consequences of marsh use, the legislative intent of the 1972 Virginia Wetlands Act, enforcement and administrative aspects of the act, and the act from the viewpoint of the electric power industry. Also covered were wetlands legislation in other states and the taking issues as it relates to wetlands. (Capehart-Florida)
W77-03685

SECTION 208 PROGRAM REVIEW, (ENVIRONMENTAL PROTECTION AGENCY), (DRAFT).
Environmental Protection Agency, Washington, D. C. Program Evaluation Div.
For primary bibliographic entry see Field 5D.
W77-03686

THE INTERNATIONAL LAW OF SCIENTIFIC RESEARCH IN THE OCEANS,
Harvard Law School, Cambridge, Mass.
R. R. Baxter.
Georgia Journal of International and Comparative Law, Vol 6, p 27-39 (1976). 13 p, 45 ref.

Descriptors: *Continental shelf, *Political aspects, *Research and development, *International law, *Oceans, International agreements, Foreign waters, Treaties, United Nations, Law of the sea, Research priorities, Water resources, Projects, Testing, Planning.

In the absence of any future agreements, the Geneva Conventions of 1958 will govern ocean research. While seabed research will be permitted, Continental Shelf research will require the consent of the coastal state. Because of the coming enlargement of offshore economic zones, research will be in danger of being restricted at a time when research teams should be given full rights to explore the ocean for the benefit of all people. Many nations are taking different negotiating positions with regard to the research issue. The developing nations known as the Group of 77 want: (1) active participation and representation by the coastal state, whereas the United States believes the coastal state should only have to be given advance notification of the impending research; (2) publication of the results of the research to be forbidden without the consent of the coastal state, whereas the United States insists that the research should be shared on an unlimited basis; and (3) assistance, when requested by the coastal state to be mandatorily furnished, while the American position is that assistance should be given only towards assessing the collected data. (Frank-Florida)
W77-03687

THE CALIFORNIA COASTAL PLAN (A SYMPOSIUM).
S Cal L Rev, Vol 49, No 4, p 710-83 (1976). 74 p.

Descriptors: *California, *Land use planning, *Coastal areas, *Coastlines, *Land management, Regional economics, Urban land use, Land development, Land resources, Comprehensive planning, Long-term planning, Cost-benefit analysis, Governmental interrelations, Industries, Governments, Political aspects, Legal aspects, Building codes, Regulation.
Identifiers: *California Coastal Plan, California Coastal Zone Commission, Orange County(Calif), Administrative regulations.

The California Coastal Plan and the legislation designed to implement that plan are evaluated and criticized here in five articles. While the broad objectives of the coastal plan, to preserve and manage the limited coastal resources of California, are applauded, the vague and ambiguous language used in the document's 162 policy recommendations is uniformly denounced. In addition, several specific attacks are made against particular provisions. For example, the plan's decision to maintain presently agricultural land in agricultural production ignores both the loss in land value to farmers who purchased coastal land with the expectation to sell for development and the attendant increase in coastal housal costs such a restriction will cause. The plan advocates high density urban development and discourages sprawl, however, in so doing it fails to consider consumer desires and may perhaps lead to a construction standstill or at least a significant slowdown. The plan's reliance on local implementation is problematic as local authorities were not allowed to participate on the commission. Also, the plan and corresponding legislation fail to establish any concrete guidelines for local authorities who may well resent the usurpation of local land-use planning powers. As a result, not only will state and local relations be strained, but the efficiency of the entire project will be diminished by the extensive litigation needed to determine the meaning and validity of the proposed coastal plan. (Moorhouse-Florida)
W77-03688

CALIFORNIA WATER LAW IN PERSPECTIVE,
California State Water Resources Control Board, Sacramento.
G. M. Craig.
In: West's Annotated California Water Code, p LXV-CVII (1971).

Descriptors: *Prior appropriation, *California, *Water rights, *Water districts, State governments, Water resources, Cities, Appropriation, Prescriptive rights, Water pollution, Water quality control, Water distribution(Applied), Flood control, Dams, Financing, Investigations, Public health, Irrigation, Reclamation.
Identifiers: *Water Resources Control Boards.

California's water law combines two principal doctrines of water rights based on opposing principles, the doctrine of appropriative rights and the doctrine of riparian rights. In addition, California recognizes the rights of the overlying owner to the use of groundwater and rights secured by prescription. This article examines the historical development of water rights in California and the most recent trends, which focus on stopping pollution of water. The following state government agencies are discussed: (1) The Department of Water Resources, whose responsibilities include the planning, construction and operation of the State Water project; (2) The State Water Resources Control Board, with powers including appropriation of water, determination of water rights and water quality control; (3) The Regional Water Quality Control Boards, with powers including formulation and adoption of plans for all areas in the region. Also examined briefly are several other agencies including, The California Water Commission, The Reclamation Board and the State Treasurer. (Martin-Florida)
W77-03689

BPT: CONSIDER THE ALTERNATIVES (BEST PRACTICAL TREATMENT CRITERION).
For primary bibliographic entry see Field 5D.
W77-03690

LEGAL CONSTRAINTS ON URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3D.
W77-03692

ANALYSIS OF THE NATIONAL FLOOD INSURANCE ACT,
Florida Univ., Gainesville. School of Law.
M. T. Hensick.
Available from Eastern Water Law Center, University of Florida, Gainesville, Fla. 32611, $2.70. (1975). 54 p, append.

Descriptors: *Flood plain insurance, *Project purposes, *Project planning, *Flood protection, *Flood plain zoning, *Floodproofing, Maximum probable flood, Flood peak, Erosion, Flood frequency, Flood recurrence interval, Flood routing, Flood control, Flood damage, Building codes, Land use, Economics.

The National Flood Insurance Act and its 1973 amendments provide federally subsidized flood and mudslide insurance protection in high risk areas. Coverage includes residential, governmental, agricultural, religions and small business property and is administered through use of private carriers. Maximum coverage limits and premium rates are set by law. Entrance into the program is dual phased and requires formal application for community coverage. The initial or emergency coverage phase of coverage involves subsidized rates and 1/2 limit coverage. After ratemaking studies are made and after the community proves its adoption of land use and control measures, the community is eligible for full coverage at actuarial rates. Land use and control measures basically require community planning to prevent construction and improvement in areas below the 100 year flood level or in areas of special hazard. Failure of communities to comply with land use measures can result in ineligibility under the program. To promote congressional intent the Act, as amended, also requires purchase of flood insurance as a condition to the grant of any federal assistance. Federal assistance is defined as including loans, grants, guarantees and any direct or indirect aid, including mortgage insurance. (Comer-Florida)
W77-03693

ARTIFICIAL AND NATURAL LAKES,
Florida Univ., Gainesville. School of Law.
A. R. Wiedinger.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $1.30. (Spring, 1976), 26 p.

Descriptors: *Florida, *Lakes, *Water law, *Ownership of beds, *Artificial lakes, *Navigable water, Riparian rights, Beds, Water resources, Water sources, Irrigation, Bodies of water, Surface waters, Lake shores, Lake basins, Recreation.
Identifiers: *Public trust doctrines.

Ownership and rights of use of two lakes in Sunshine Shores, Florida are unclear. This specific problem serves as a focal point for a study of the laws of lake ownership in general in Florida. Related topics examined include: navigability and its different tests; common-law riparian rights of abutting landowners; statutory and regulatory modification of rights; and subdivision rights. Also statutory and regulatory modification of rights; and subdivision rights. Also presented is a history of lake ownership laws from the 1821 Treaty of Cession onward. The historic test of navigability fails, however, when applied to the two lakes in Sunshine Shores because they are not navigable waters; consequently, they may be privately owned. In addition to the problems of ownership, there are other legal problems to be considered in the construction of lake-connecting irrigation ditches, seawalls and docks, and in the pumping of

water for irrigation. Furthermore, all lakes are not legally similar with many distinctions made between natural and artificial lakes. Thus, the type and extent of construction and irrigation allowed will depend on numerous considerations. (Frank-Florida)
W77-03694

OWNERSHIP OF SUBMERGED LANDS IN FLORIDA,
Miami Univ., Coral Gables, Fla. School of Law.
R. C. Ausness.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $5.25. (1973), 105 p.

Descriptors: *Florida, *Beds under water, *Ownership of beds, *Navigable waters, *Mangrove swamps, Wetlands, Coastal marshes, Shallow water, Surface waters, Land tenure, Boundaries(Property), Boundary disputes, Regulation, Permits, Water conservation, Natural resources.
Identifiers: *Navigability tests, *Public trust doctrine, Navigational servitude, Estoppel, Fill permits, Water rights(Non-riparian), Statute of limitations.

When Federal surveys of Florida waters were made, snakes and Indians posed a problem. As a result, only about 200 of the 30,000 lakes were meandered. After title to swamplands passed to Florida in 1850 the state conveyed some 19 million acres to private owners. Unfortunately some of the swampland conveyed was actually navigable water. Since Florida doesn't rely on meandering but on 'navigability in fact' to determine ownership, the question of ownership under the public trust doctrine of submerged lands is significant. Probably neither Florida's 'Grant to Reparians' law nor the Marketable Record Title Act will cure all invalid transfers of sovereignty land but the state may be stopped from challanging the conveyances so ownership is still a problem. In conjuction with ownership, use rights to fill the lands raises regulation questions. The federal government through the Corps of Engineers can regulate fill operations and will probably be more active when state action is absent. Florida should enact zoning-type fill regulations to assure that the environment is protected. (Comer-Florida)
W77-03695

LEGAL PROTECTION FOR FLORIDA WETLANDS,
Florida Univ., Gainesville. School of Law.
R. Campbell.
Available from Eastern Water Law Center, University of Florida, Gainesville, FL 32611, $.85. (Summer 1975), 17 p.

Descriptors: *Marsh management, *Florida, *Wetlands, *Protection, Legislation, Marshes, Coastal marshes, Salt marshes, Tidal marshes, Bogs, Swamps, Rivers and Harbors Act, Legal aspects, Lakes, Ponds, Flood protection, Flood control, Flood plains, Estuaries, Fish, Shellfish.

The value of Florida's wetlands in their natural state has been underestimated. Wetlands, including tidal marshes, estuarine zones, swamps, lakes and ponds, have the capacity to absorb vast quantities of water thereby acting as natural means of flood control. Developers, however, view them as means for creating expensive water front property or expanding industry. Wetlands have phenomenal productivity, are vital in the production and survival of waterfowl and certain fur-bearing animals and fish. The development and destruction of wetlands has had a devastating effect on the harvesting of fish and shellfish. Certain federal and state laws have been implemented to prevent further destruction. These include the Rivers and Harbors Act of 1898, The Fish and Wildlife Coordination Act of 1970, the National Environmental Policy Act, Florida's State Parks and Preserves System, the State Wilderness System Act, the Bulkhead Act, and the Land and Water Management Act. The latter two acts are Florida's most important laws with respect to preservation. (Cowart-Florida)
W77-03696

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN ESCAMBIA AND SANTA ROSA COUNTIES, FLORIDA ('ESCAROSA'),
Miami Univ., Fla. School of Law.
D. M. O'Connor.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $5.35. March 1972, 107 p.

Descriptors: *Shore protection, *Local governments, *Coordination, *Florida, *Water law, Legislation, Judicial decisions, Local governments, State governments, State jurisdiction, Federal government, Federal jurisdiction, Shores, Fisheries, Wildlife habitats, Wildlife conservation.
Identifiers: *Coastal zone management.

While many studies have been done on federal and state laws relating to coastal zone management, far less emphasis has been placed on action at county and local levels. Examined here are the legal aspects of coastal zone management in the Escambia and Santa Rosa Counties of Florida. An entire statutory history is given, as well as relevant judicial decisions. The resulting conclusion is that local governments can play a greater role than they have been. The following recommendations are made: (1) local decisions should be made in conformity with the Florida Coastal Zone Master Plan; (2) the Attorney General should clarify the extent of authority of the Coastal Coordinating Council; (3) the Council should serve as the single coordinating body at the state level for all local decisions; (4) local levels of government should develop future use plans for these coastal zones; and (5) local governments should research and prepare whatever new ordinances are needed. (Frank-Florida)
W77-03697

ENVIRONMENTAL PROTECTION IN MEXICO AND CANADA,
Florida Univ., Gainesville. School of Law.
L. A. Lewis.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida, 32611, $1.55. May 27, 1976, 31 p.

Descriptors: *Canada, *Mexico, *Environmental control, *Protection, Pollution abatement, Air pollution, Water pollution, Abatement, Water pollution control, Legal aspects, Common law, International law, Regulation, Legislation, Planning, Administration, Governments, Remedies, Ecology, Environment, Environmental effects.

Existing problems of protecting the ecosystems remain, and new problems will appear with new technological developments. Thus protection of the environment is not a moot issue. To illustrate various problems that exist, the author compares the environmental problems and legal solutions of Mexico and Canada. Mexico furnishes an example of a developing third world nation rapidly discovering the competing demands of the ecology and an economic development policy. Mexico has recently enacted comprehensive and forceful anti-pollution legislation; its effect can only be judged in the future. Canada's problems with pollution parallel those of the United States and differ from those of Mexico. Various common law remedies have been available to Canadians suffering damage as a result of pollution, but statutory remedies are also necessary. The steps taken by Canada to prevent pollution are similar in many ways to those taken in the United States. The author stresses the beneficial aspects of nations trading information regarding pollution control. (Cowart-Florida)
W77-03698

COASTAL ZONE MANAGEMENT IN FLORIDA,
Florida Univ., Gainesville. School of Law.
D. Welch.
Available from Eastern Water Law Center, University of Florida, Gainesville, Fl. 32611, $1.80. Spring 1976. 36 p, 96 ref.

Descriptors: *Florida, *Coasts, *Comprehensive planning, *Land use, *Regulation, Planning, Environmental effects, Human population, Waste disposal, Erosion, Oil, Wetlands, Water shortage, Land management, Zoning, Local governments, State governments, Federal government, Legislation, Land resources, Long-term planning.
Identifiers: *Coastal zone management, *Coastal Zone Management Act, Land use planning.

With approximately 80% of the nation's population living in the 30 coastal states, the increasing land use pressures on the coastal zones call for coastal land management programs to protect the economic and environmental values in these areas. In the past, land use planning has been delegated to local governments resulting in haphazard, fragmented policies. The federal government has become indirectly involved in coastal zone management through the National Environmental Policy Act, the Clean Air Act of 1970 and the Federal Water Pollution Control Act as amended in 1972. Direct federal involvement came with passage of the 1972 Coastal Zone Management Act. As a result of a severe drought, the Florida legislature enacted a number of comprehensive land use controls which can be useful in the coastal zone management area. These include the Environmental Land and Water Management Act, the Land Conservation Act, the Water Resources Act, the State Comprehensive Planning Act, and the Local Government Comprehensive Planning Act. (Capehart-Florida)
W77-03699

CONTINGENCY PLAN FOR SPILLS OF OIL AND HAZARDOUS MATERIALS FOR INLAND WATERS OF REGION III.
Environmental Protection Agency, Philadelphia, Pa. Region III.
For primary bibliographic entry see Field 5G.
W77-03700

THE COSTS AND EFFECTS OF CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS IN THE ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W77-03701

GENERAL STATE POWERS OVER WATER.
Cal Water Code Ann secs 100 thru 108 (West 1971).

Descriptors: *California, *Water rights, *Public benefits, *Riparian rights, *Water utilization, Domestic water, Irrigation water, Water supply, Watersheds(Basins), Water conservation, Appropriation, Legislation, Municipalities, Water requirements, Legal aspects, Water resources.

California has enacted legislation requiring that the water resources of the state be put to beneficial use to the fullest extent of which they are capable. All water within the State is the property of the people of California, but the right to the use of water may be acquired by appropriation. The State shall determine what water, surface and underground, can be converted to public use, and in what way the water should be developed for the greatest public benefit. The use of water for domestic purposes is the highest use of water in California; the next highest use is for irrigation. Municipalities shall not acquire or hold any right to waste water or to use water for other than municipal purposes. Whenever the legislature authorizes any project which will develop water for use outside the watershed in which it

originates, it shall consider authorization of other works to satisfy the requirements of such watershed. (Martin-Florida)
W77-03703

STATE ADMINISTRATION GENERALLY (POWERS AND DUTIES OF THE DEPARTMENT OF WATER RESOURCES).
Cal Water Code Ann secs 120, 125 thru 134, 205, 225 thru 236, 250 thru 346 (West 1971).

Descriptors: *Administrative agencies, *California, *Water resources, *Artesian wells, *Eminent domain, Weather modification, Data collections, Surveys, Investigations, Water supply, Water quality, Reservoirs, Appropriation, Organizations, Reclamation, Condemnation, Properties, Water loss, State governments, Legislation, Water utilization.
Identifiers: *Yuba River.

California has enacted legislation providing that, subject to the approval of the governor, the Director of Water Resources is responsible for organizing the Department of Water Resources. The Department is authorized to: (1) carry on topographic surveys and investigations into matters pertaining to the water resources of the State along the lines of hydrography, hydroeconomics, and the use and distribution of water for agricultural purposes; (2) investigate conditions of the quality of all waters within the State; (3) condemn for State water and dam purposes any real property which it is authorized to acquire; (4) take appropriate proceedings to prevent waste and unreasonable use of water in the State. Furthermore, any person owning, possessing, or occupying any land upon which is situated an artesian well and who causes water unnecessarily to flow from the well or to go to waste is guilty of a misdemeanor. Finally, any funds appropriated for Yuba River debris control shall be used for restraining, impounding and control of debris resulting from mining operations, natural erosion or other causes. (Martin-Florida)
W77-03704

KLAMATH RIVER BASIN COMPACT.
Cal Water Code Ann secs 5900 thru 5901 (West 1971).

Descriptors: *Interstate compacts, *California, *Oregon, *River basins, *Water pollution control, Legislation, Appropriation, Water rights, State governments, Permits, Natural resources, Environmental effects, Hydroelectric power, Administration, Conservation, Planning, Legal aspects, Rivers, Irrigation, Water distribution(Applied).
Identifiers: *Klamath River basin(Ore).

The major purposes of the Klamath River Basin Compact are to facilitate and promote the orderly, integrated and comprehensive development, use, conservation and control of the basin's water resources; and to further intergovernmental cooperation and comity with respect to these resources and programs for their use and development. Rights to the use of unappropriated waters originating within the Upper Klamath River Basin for any beneficial use in the basin, by direct diversion or by storage for later use, may be acquired by any person by appropriation under the laws of the state where the use is to be made. In granting permits to appropriate waters each state shall give preference to applications for a higher use in accordance with the following order of uses: (1) domestic use, (2) irrigation use, (3) recreational use, (4) industrial use, (5) generation of hydroelectric power, and (6) other uses. There is hereby created a commission to administer this compact. The states recognize that protection of the beneficial uses of the waters of the basin requires cooperative action of the two states (California and Oregon) in pollution abatement and control. (Martin-Florida)
W77-03705

OREGON- CALIFORNIA GOOSE LAKE INTERSTATE COMPACT.
Cal Water Code Ann secs 5950-5951 (West 1971).

Descriptors: *Interstate compacts, *California, *Oregon, *Lakes, *Legislation, Appropriation, Water resources, Lake basins, Planning, Administration, State governments, Regulations, Construction, Facilities, Water rights, Conservation, Legal aspects, Coordination, Water distribution(Applied).
Identifiers: *Goose Lake Interstate Compact.

The major purpose of the Goose Lake compact is to facilitate and promote the orderly, integrated and comprehensive development, use, conservation and control of the water resources of Goose Lake Basin. Export of water from Goose Lake Basin for use outside the basin without prior consent of both state legislatures is prohibited. Each state hereby grants the right for a person to construct and operate facilities for the measurement, diversion, storage and conveyance of water from the Goose Lake Basin in one state for use within the basin in the other state, providing the right to such use is secured by appropriation under the general laws administered by the State Engineer of the State of Oregon or the Water Rights Board of California. The laws of the state from which the water is to be taken shall control. Construction and operations of any facilities in one state to implement use of water in the other state, shall be subject to the laws of the state in which the facilities are constructed. (Martin-Florida)
W77-03706

TAYLOR V BOARD OF LEVEE COMMISSIONERS OF THE TENSAS BASIN LEVEE DISTRICT (A TAKING FOR LEVEE PURPOSES).
332 So2d 495-99 (La Ct App 1976). 5 p.

Descriptors: *Louisiana, *Levees, *Levee districts, *Appropriation, *Eminent domain, Engineering structures, Legal aspects, Judicial review, Flood control, Retaining walls, River regulation, Water rights, Legal review, Constitutional law, Public rights, Riparian land.
Identifiers: *Tensas Basin Levee District(La).

Plaintiff property owner brought suit against defendant levee district to recover the value of land taken for the construction of a levee. In Louisiana, appropriation by the state for the construction of levees is restricted to riparian property fronting on a navigable river when the land was first separated from the soverign. Such appropriation of riparian land does not violate the Fifth Amendment Due Process Clause. The plaintiff contended that the defendant did not meet the burden of proof by showing that the land involved was riparian property; also, he contended that the fair market value award by the lower court was not excessive in view of the evidence presented. The court upheld the lower court's finding that the property involved was not riparian and thus not subject to appropriation. The court also found that the award of fair market value of the property was not excessive and that the remainder of plaintiff's tract suffered no diminution in value as a result of the taking, but that the taking, in fact, had improved the access to the property. (Welch-Florida)
W77-03707

THE DELTONA CORPORATION V BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENR TRUST FUND.
No 73-1046 (2d Cir Ct. Leon County, Fla, Jan 31, 1975). 17 p.

Descriptors: *Lakes, *Boundary disputes, *Florida, *Navigable waters, *Meanders, Water policy, Water resources, Freshwater, Zoning, Public lands, Public benefits, Public rights, Patents, Submerged Lands Act, Equity, Nonnavigable waters, Judicial decisions, State governments, Legal aspects.
Identifiers: *Navigable in fact, *Public trust.

Plaintiff development corporation sought declaratory and injunctive relief against defendants Board of Trustees of the Internal Improvement Fund, the Game and Fresh Water Fish Commission, and the intervening Attorney General of Florida. At issue was the ownership of certain nonmeandered lakes which were included within the perimeters of land granted to the plaintiff in U. S. Patents and in Trustees' deeds. The defendants contended that the lakes were navigable in fact, despite their being nonmeandered. Based upon this contention, the defendants argued further that the Trustees did not have the authority to convey navigable lakes because the state holds title to land covered by navigable water in trust for the public. The Leon County Circuit Court held that nonmeandered lakes are considered by statute to be non-navigable when such lakes are not excluded from surrounding property conveyed by the state in the same conveyance. Therefore, the defendants as representatives of the state were stopped from asserting their claims. The Court also noted that certain of the conveyances at issue could be upheld through application of the Marketable Title Act. Therefore, summary judgment for the plaintiff was entered. (Josepher-Florida)
W77-03708

BARNES V UNITED STATES (COMPENSATION FOR FLOWAGE EASEMENT TAKEN OVER PLAINTIFFS' LANDS).
538 F2d 865-75 (Ct Cl 1976). 11 p.

Descriptors: *Dams, *Seepage, *Condemnation value, *Judicial decisions, *Missouri River, Backwater, Flow control, Underseepage, Condemnation, Legal aspects, Easements, Compensation, Value, Riparian land, Banks, Riparian rights, Flooding, River flow, Channel flow, Rivers, River systems, Bodies of water, Deltas, Downstream, Upstream, *Nebraska.
Identifiers: *Dam effects, Proximate causation, Statute of limitations, Niobrara River, Gavins Point Dam, Fort Randall Dam.

Plaintiff riparian landowners sought compensation for the alleged taking of their land by the United States. Plaintiffs' farmlands were located adjacent to the confluence of two rivers. Plaintiffs alleged that the government's control of the river flow through its dams had caused frequent and recurring flooding of their land. Since 1969, sizable water releases from the Fort Randall Dam between August and November each year have caused flooding of plaintiffs' land. While surface flooding did occur in isolated areas, the plaintiffs listed seepage, impaired surface and subsurface drainage, and raised groundwater table as the bases for their suit. The Court of Claims held for the plaintiffs finding that a taking under the fifth amendment had occurred. A constitutional taking is not limited to the overflowing of a river's banks but includes percolation and rising water tables provided the intermittent flooding is inevitably recurring, as was shown here, and provided the waters rise above the ordinary high water mark. Defendant argued that such a taking must have dated from 1969, and that the claim was therefore barred by the statute of limitations. The court found that the date of taking is when the permanent character of intermittent flooding can be fairly perceived. Plaintiffs' claims for compensation for crops lost between 1969 and 1973 (the date of taking) were denied. The court held that the defendant took a flowage easement appurtenant to plaintiffs' lands and must compensate plaintiffs upon receipt of deeds conveying perpetual easements to flood the land. (Moorhouse-Florida)
W77-03709

KEMPF V ELLIXSON (DETERMINATION OF RIPARIAN RIGHTS WHERE LAND IS SEPARATED FROM BODY OF WATER BY PUBLIC HIGHWAY).
244 NW2d 476-78 (Ct App Mich 1976). 3 p.

Descriptors: *Riparian rights, *Judicial decisions, *Michigan, *Lake shores, Legal aspects, Lakes, Highways, Roads, Streets, Water law, Riparian land, Adjacent landowners, Legal review, Public access, Public rights, Trespass, Shores, Bodies of water, Recreation, Recreation demand.
Identifiers: Injunctions(Prohibitory).

Plaintiffs, front lot owners of property abutting a lakeshore highway, sought injunctive relief to prevent use of the lakeshore by defendants. Defendants, back lot owners and others, had built docks out from the shore of the lake directly across the boulevard from plaintiffs' property. An injunction was granted by the trial court and defendants appealed. Defendants contend that placement of the boulevard right-of-way in the lake makes the rule that riparian rights attach to land separated from a body of water by a highway inapplicable and creates public rights in the right-of-way not only for travel, but also for waterfront recreation. The Michigan Court of Appeals rejected both arguments reasoning that the fact that no land intervenes on the opposite side of the highway merely strengthens plaintiffs' riparian rights. Furthermore, to prevxent riparian rights from attaching to lots abutting waterfront property, an express limitation must be included in the plats dedicating the property for the roadway. Defendants' alternative assertion that a public easement had been established was also found to be without merit. The court opined that unless there is some minimal action by government to facilitate and control recreational use a public easement cannot be established by prescription. The judgement of the lower court was affirmed with one exception. Individual claims of prescriptive easement were remanded for specific consideration of each factual claim. (Moorhouse-Florida)
W77-03710

DAMAGES COMPENSABLE UNDER FEDERAL MARITIME LAW FOR INJURIES CAUSED BY DISCHARGE OF OIL INTO NAVIGABLE WATERS,
For primary bibliographic entry see Field 5G.
W77-03711

VALIDITY, CONSTRUCTION, AND APPLICATION OF S 5 OF RECLAMATION LAW OF 1902 (43 USCS S 431),
R. P. Eclavea.
27 ALR Fed 831-42 (1976). 12 p.

Descriptors: *Reclamation, *Water utilization, *Water users, *Federal reclamation Law, Legal aspects, Legislation, Federal government, Judicial decisions, Legal review, Social aspects, Water rights, Equitable apportionment, Equity, Federal-state water rights conflicts, Irrigated land, Water allocation(Policy), Water contracts, Constitutional law, Public rights, Water law, Agriculture.
Identifiers: *Reclamation Act of 1902, Standing(Legal), Water rights(Non-riparian).

Section 5 of the Reclamation Act of 1902 prohibits the sale of the right to use water for land in private ownership if the plot exceeds 160 acres. The act also requires that the owner of such land be a bona fide resident of such land, or live in the neighborhood. This act has been strictly construed in litigation. It has been held that the language of the act is mandatory and not discretionary. Litigants have challenged the acreage requirement on equal protection and due process grounds of the fifth and fourteenth amendments to no avail. The courts have reasoned that the federal reclamation projects were established as a subsidy to agriculture, and that since such projects were subsidies, Congress could decide who should be subsidized. In upholding the residency requirement, courts have stated that while discrimination between new and old residents is not allowed; discrimination between residents and non-residents is permissible. Courts have granted standing to enforce the act to any resident of property in the vicinity of a tract acquiring water in violation of the act's provisions. (Moorhouse-Florida)
W77-03712

BOYER V DEPT OF HEALTH (LOCATION OF LEACH FIELD RELATIVE TO WATER SUPPLY).
381 NYS2d 805-08 (App Div 1976). 4 p.

Descriptors: *Wells, *New York, *Sanitary engineering, *Sewage disposal, *Water permits, Legal aspects, Control, State governments, Environmental engineering, Disposal, Effluents, Environmental sanitation, Public health, Wastes, Plumbing, Septic tanks, Leaching, Judicial decisions, Adjacent land owners, Waste disposal.

Plaintiff property owner brought suit to vacate approval of defendant adjoining land owner's subsurface sanitary disposal system and to vacate the certificate of occupancy. Plaintiff was serviced by two wells locate i upon his property. Defendant's newly constructed septic system was 84 feet from the well on plaintiff's property and thus in noncompliance with the State Sanitary Code standards. Health Department affidavits, however, indicated that there was no possible way that defendant could literally comply with the standards. The court held that standards were not mandatory but were merely a guide or recommendation to be interpreted in light of the complexities of the particular area. The court further held that it was within the fact-finding province of the Health Department to determine whether defendant's sanitary disposal system should be approved and that the determination was not arbitrary or illegal under the circumstances. Thus, the lower court decision dismissing the complaint was affirmed. (Welch-Florida)
W77-03713

KATTOR V SABATINI (NO RIGHT OF DIVERTING SURFACE WATER BY ARTIFICIAL CHANNEL).
351 NE2d 553-55 (Mass App Ct 1976). 3 p.

Descriptors: *New York, *Runoff, *Artificial watercourses, *Surface waters, *Surface runoff, Surface drainage, Legal aspects, Judicial decisions, Drainage water, Overland flow, Watercourses(Legal aspects), Adjacent landowners, Equity, Legal review, Prescriptive rights, Water law, Water rights.
Identifiers: *Injunctive relief.

Plaintiff landowner sought to enjoin defendant adjoining landowner from channeling surface water onto plaintiff's property. Defendant had constructed a gravel drainage system on his land to catch water and prevent it from flowing toward his building and parking lot. The water caught was channeled onto plaintiff's land and not into a natural water course. The lower court did not issue an injunction because plaintiff inadvertently allowed a sign overhang of one foot to intrude on defendant's property. The appellate court held this was insufficient basis for the defense of 'unclean hands' and upheld the settled principle that a landowner may not divert surface water onto an adjoining landowner's property by an artificial channel. The court further held that the injunction should have been issuded to prevent the continuing trespass and the possible arising of prescriptive rights. Even though no monetary damage was proven, this did not negate a finding of a continuing injury. (Welch-Florida)
W77-03714

CANAL AUTHORITY V OCALA MANUFACTURING ICE AND PACKING COMPANY (CONSTRUCTION OF CROSS FLORIDA BARGE CANAL).
332 So2d 321-27 (Fla 1976). 7 p.

Descriptors: *Condemnation, *Florida, *Canal construction, *Canals, *Eminent domain, Legal aspects, Inland waterways, Transportation, Bodies of water, Right-of-way, Water law, Judicial decisions, Federal jurisdiction, State jurisdiction, Competing uses, Project planning, Planning.

Appellant Canal Authority brought eminent domain proceedings to condemn the fee simple title of five parcels of land owned by the appellee for construction of the Cross-Florida Barge Canal. The Canal Authority acquired fee simple title to two of the parcels, acquired perpetual easements over two other parcels, but was unable to obtain any judgment as to the remaining parcel. The Canal Authority then asked the U. S. Army Corps of Engineers to acquire that parcel by means of a federal eminent domain suit. Appellee subsequently brought this action to recover damages resulting from the change. The Supreme Court of Florida held that the Canal Authority had statutory authority to seek the aid of the Corps of Engineers, and that it would not require payment to appellee of any losses in fees and costs resulting from the Canal Authority's abandonment of state action to condemn the land. (Cowart-Florida)
W77-03715

CLEAR LAKE APARTMENTS, INC V CLEAR LAKE UTILITIES (EXCLUSIVE RIGHT TO PROVIDE WATER NOT A COVENANT RUNNING WITH THE LAND).
537 SW2d 48-55 (Tex Civ App 1976). 8 p.

Descriptors: *Texas, *Water contracts, *Contracts, *Supply contracts, *Municipal water, Water rights, Legal aspects, Water law, Judicial decisions, Common law, Equity, Jurisdiction, Water supply, Sewerage, Water delivery, Water conveyance.

Plaintiff water supplier brought this declaratory judgement action to determine the status and validity of a contract between plaintiff and defendant apartment owner and of another contract between plaintiff and defendant city water authority. The contract between plaintiff and defendant landowner's predecessor in interest had granted plaintiff exclusive rights to furnish water and sewer service. The contract between plaintiff and defendant municipal water authority also granted plaintiff the exclusive right to furnish services to the particular area concerned. The court rejected plaintiff's contention that the just contract was a covenent that ran with the land and bound successors in interest to the land. The agreement was not sufficient to create an equitable interest in the land in plaintiff; thus, the other property owners in the tract of land were not bound by the court's decision. The failure to join the other landowners in the tract, necessary parties to such a suit, denied the court jurisdiction to enter a declaratory judgement concerning the contract with the municipal water authority. The court found, however, that a contract between the defendant water authority and the municipality concerning water service rights did not violate the authority's contract with the plaintiff. (Welch-Florida)
W77-03716

STATE EX REL COX V WOLFE (STATUTE PROHIBITING REMOVAL OF MATERIAL FROM BED OR BANKS OR FILLING OF WATERS OF STATE WITHOUT A PERMIT).
549 P2d 1281-83 (Ore Ct App 1976). 3 p.

Descriptors: *Landfills, *Oregon, *Water permits, *Channel flow, *Diversion, *Alteration of flow, Channels, Routing, Streamflow, Barriers, Bypasses, Flow, Stream improvement, Legal aspects, Legislation, Drainage engineering.
Identifiers: *Injunctions(Mandatory), *Fill permits, *Injunctive relief.

Plaintiff state land division sought a mandatory injunction against defendant to require defendant to restore a diverted stream to its natural channel. Defendant sought a state permit to divert the stream and remove material from the proposed new channel into the diverted stream. The permit was denied. The plaintiff contended that defendant had proceeded with his diversion without a permit resulting in irreparable damage. The defendant contended that the amount of material removed was not specified as required by statute, and thus that plaintiff had not stated a cause of action. The court held for the defendant. In order to state a cause of action the statute required that plaintiff allege the removal or fill of at least 50 cubic yards of material. (Welch-Florida)
W77-03717

KRAVEC V STATE (INTERIOR LAND OWNERS' RIGHT TO BRIDGE STATE'S DRAINAGE DITCH EASEMENT).
382 NYS2d 181-85 (App Div 1976). 5 p.

Descriptors: *New York, *Drainage systems, *Legal aspects, *Drainage water, *Easements, Drainage practices, Drainage, Drainage programs, Condemnation, Public access, Right-of-way, Ditches, Judicial decisions, Legal review, Severance, Compensation, Damages.

Plaintiff landowner brought suit to recover damages from defendant state for defendant's appropriation of a permanent drainage easement over plaintiff's vacant lot. Plaintiff's lot contained an easement appropriated by defendant along with an easement granted by plaintiff's predecessor in title to Onondaga County. Defendant's easement reservation was for use as a drainage structure while the county's easement was for any public use. The plaintiff contended that defendant's easement denied them access to the interior access of their lot. Defendant contended that the right of access was not impaired and that bridging the easement would not affect the drainage. The court held that while easements are to be construed strictly against the state, in this instance the defendant's easement permitted plaintiff to obtain access to their interior lands by bridging the ditch since this would not interfere with the defendant's use of the easement as a drainage structure. Since the county easement was 'for public use' and there was no reservation of rights to the landowner, plaintiff was barred access to the interior lands through the county's easement. (Welch-Florida)
W77-03718

PROTECTION OF WATER SUPPLY.
Okla Stat Ann, Tit 11, secs 298 thru 310.1 (1959).

Descriptors: *Oklahoma, *Water supply, *Cities, *Water works, Streams, Reservoirs, Water districts, Public health, Highways, Contracts, Eminent domain, Federal government, Water rights, Financing, Pipelines, Pollution, Protection, Water quality control, Irrigation, Land tenure, Water pollution control, Lakes, Right-of-way, Legislation.

A city whose water supply comes from a body of water outside the city limits may designate a water district encompassing the watershed to protect the water supply. A city which has acquired a reservoir site for a water supply may close any public road leading to or through such site. A city which owns a water works may use the water for public purposes outside the city limits. If there is an excess of water, the city may sell it to parties outside the city limits. Contracts for such sale may be abrogated at any time the water is required within the city. A city may acquire land for anticipated water requirements either within or without the city limits through eminent domain. A city may join with another city to finance construction of a joint water works upon approval of the voters of each city. A city may acquire land or water rights from an adjoining state when the land is within the desired watershed. Under limited circumstances, a city in an adjoining state may acquire land within Oklahoma for use in connection with a municipal water system. (Capehart-Florida)
W77-03719

MARINE SANITATION.
Cal Harbors and Navigation Code Ann secs 775 thru 786 (West Supp 1976).

Descriptors: *California, *Environmental sanitation, *Waste disposal, *Ships, Bodies of water, Boats, Sewage wastes, Regulation, Marinas, Law enforcement, Cities, Local governments, Public health, Water pollution, Waste water(Pollution), Sewage effluents, Legislation.
Identifiers: *Injunctive relief, *Marine sanitation devices.

The state of California has adopted uniform standards and procedures for the regulation of sewage discharge from vessels into state waters. Local governments may regulate the discharge of sewage from vessels but may not restrict the type of marine sanitation device installed in a vessel. Marine terminals shall provide sewage retention device pumpout facilities at locations which are convenient and accessible to boat owners. Such facilities must be operated so as to prevent the discharge of any sewage into state waters. The State Water Resources Control Board shall adopt standards for the construction, operation, and maintenance of pumpout facilities. (Capehart-Florida)
W77-03720

DELETERIOUS SUBSTANCES IN STREAMS.
Okla Stat Ann, Tit 29, sec 408 (1958).

Descriptors: *Oklahoma, *Pollutants, *Water pollution, *Bodies of water, Streams, Lakes, Ponds, Lime, Explosives, Poisons, Sawdust, Saline water, Oil, Surface runoff, Testing, Administrative agencies, Penalties(Legal), Toxins, Fish population.

No deleterious substance such as lime, dynamite, poison, drugs, sawdust, salt water or crude oil shall be placed in or allowed to wash into any stream, lake or pond in Oklahoma, except that the Game and Fish Commission may use drugs and chemicals in connection with scientific testing. Fines are established for any person violating this provision. (Capehart-Florida)
W77-03721

OWNERSHIP OF WATER.
Okla Stat Ann Tit 60, sec 60 (1971).

Descriptors: *Oklahoma, *Land tenure, *Natural flow doctrine, *Streamflow, Surface waters, Real property, Groundwater, Streams, Domestic water, Natural flow, Obstruction to flow, Pollution, Appropriation, Public rights, Dams, Administrative agencies, Water storage, Legal aspects, Riparian rights.

Oklahoma has enacted legislation declaring that a land owner owns the water standing on his land or flowing over or under its surface if the water does not form a definite stream. Water which does run in a definite stream may be used by a land owner, and the stream may even be dammed as long as the natural flow of the stream leaving the property remains the same as that entering the property. The landowner may not pollute the waters of the stream since they are public waters subject to appropriation by the state. (Capehart-Florida)
W77-03722

ACQUISITION OF PROPERTY (ISLANDS).
Okla Stat Ann tit 60, secs 337 thru 340 (1971).

Descriptors: *Accretion(Legal aspects), *Oklahoma, *Islands, *Boundaries(Property), *Land tenure, Navigable waters, Beds, Non-navigable waters, Rivers, Channels, Shores, Streams, Streamflow, State governments, Real property, Public lands, Legal aspects, Streambeds, Legislation.

The ownership of islands in the state of Oklahoma is herein defined. The state owns islands or accumulations of land formed in navigable streambeds unless there is another existing title or prescription. In non-navigable streams, islands belong to the landowner of the shore on the side where the island has formed. If an island is not on one side, it is divided between the owners on each side by a line along the center of the stream. If a stream forms an island by cutting a new channel, the island remains the property of the original owner. If a stream shifts its course, the owners of the land occupied by the stream become owners of the former streambed in proportion to the amount of land lost. (Capehart-Florida)
W77-03723

WATER AND SEWAGE.
Okla Stat Ann tit 63, secs 1-901 thru 1-910 (1973).

Descriptors: *Oklahoma, *Public health, *Sewage disposal, *Water supply, *Water, Sewage, Streams, Groundwater, Surface waters, Domestic wastes, Industrial wastes, Potable water, Well regulations, Water pollution, Standards, Water works, Water distribution(Applied), Water storage, Water purification, Construction, Permits, Administrative agencies.

Oklahoma has enacted legislation providing that pollution of water-bearing strata shall be avoided by the plugging of abandoned or unused water wells. Willful or malicious contamination of any water source or water-bearing strata which is or may be used for domestic use is unlawful. The state board of health shall regulate the supply of water for domestic use and the construction and operation of waterworks and sewage treatment systems. In addition, the board is authorized to maintain and operate laboratories to investigate the need for and the operation of sewage treatment plants. A permit from the health commissioner is required of any person supplying water to the public. Permits are also required for the construction of a sanitary sewer system and for the discharge of sewage into the waters of the state. Such discharge of sewage will be permitted only if there is no adverse affect on public health. (Capehart-Florida)
W77-03724

WATER TRANSPORTATION SERVICE.
Okla Stat Ann Tit 17 secs 159.11 thru .26 (Supp 1975).

Descriptors: *Utilities, *Oklahoma, *Transportation, *Water conveyance, *Regulation, Pipelines, Water, Canals, Administrative agencies, Pollution, Water rights, Water loss, Conveyance structures, Water distribution(Applied), Financial feasibility, Feasibility, Project feasibility, Legislation.

A certificate of public convenience and necessity must be obtained from the Oklahoma Corporation Commission before any person may construct a water transportation line to carry water for public purposes. Duplicate or competing lines will not be permitted unless they are required for adequate public service. Application for a certificate must include information about the physical and financial feasibility of the project, the financial ability of the applicant, and the construction schedule for the project. The applicant must also show that there will not be an excessive water loss through the project facilities and that the water will not be polluted or degraded while in the project facilities. The rates of the water transportation line will be

regulated by the Corporation Commission. This act does not apply to certain governmental units such as water districts, or to municipalities, private companies operating water transportation lines for their own use, and federal or state agencies.
W77-03725

CONDEMNATION OF LAND AND WATER RIGHTS.
Okla Stat Ann, tit 11, secs 292-293 (1959) as amended (Supp 1975).

Descriptors: *Oklahoma, *Cities, *Condemnation, *Water works, Land, Water rights, Non-navigable waters, Legislation, Dams, Rivers, Streams, Diversion, Water courses(Legal aspects), Protection, Pollution, Eminent domain, Water management(Applied), Watershed management, Water supply, Reservoirs.

Oklahoma has enacted legislation granting to cities the power to dam any non-navigable waterway and to condemn such land as is needed for the construction of a municipal waterworks. A city may also divert water from the waterway when necessary so long as the diversion does not change the regular channel of the waterway. A city may acquire land to protect a water supply reservoir from contamination or pollution. Except as required for reservoir protection or for water use, no use shall be made of and no structure shall be placed on land within 660 feet of the high water line of a reservoir. (Capehart-Florida)
W77-03726

LEVEES, DRAINS AND DITCHES,
Okla Const, art XVI, sec 3. (not dated).

Descriptors: *Oklahoma, *Drainage systems, *Irrigation ditches, *Taxes, Levees, Drains, Ditches, Irrigation, Legislation, Crops, Bond issues, Real property, Legal aspects, Land tenure, State governments, Engineering structures, Channels, Water management(Applied), Operating costs, Financing.

When necessary, the legislature shall provide for a system of levees, drains, and ditches and of irrigation. These systems shall be financed by taxes levied against the lands or the crops produced on lands affected or benefited by such a system. Land owners or lessees of benefited lands will be required to issue bonds. (Capehart-Florida)
W77-03727

WATER PROBLEMS IN THE COLORADO RIVER BASIN: LEGAL AND INSTITUTIONAL FRAMEWORK,
Economic Research Service, Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-03830

INSTITUTIONS AND OBJECTIVES ON THE WATER, ENERGY, ENVIRONMENT INTERFACE,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W77-03934

KEYNOTE SPEECH, SECOND ANNUAL CONFERENCE ON RESTORATION OF COASTAL VEGETATION IN FLORIDA,
Environmental Protection Agency, Atlanta, Ga.
For primary bibliographic entry see Field 5G.
W77-03943

THE NATIONAL FLOOD INSURANCE PROGRAM: EXPLANATION AND LEGAL IMPLICATIONS,
Federal Highway Administration, Washington, D.C. Office of General Counsel.
For primary bibliographic entry see Field 6F.
W77-03956

MULTIPURPOSE DEVELOPMENT ON THE TISZA RIVER.
For primary bibliographic entry see Field 4A.
W77-03957

LEGAL PROBLEMS IN CHANGING USES OR COORDINATING USES OF KEYHOLE RESERVOIR,
Wyoming Univ., Laramie. Water Resources Research Inst.
K. D. Wagner.
Land and Water Law Review, Vol 9, p 485-506 (1974). 22 p, 101 ref. OWRT A-999-WYO(20).

Descriptors: *Wyoming, *South Dakota, *Interstate compacts, *Reservoir operation, *Recreation, Recreation facilities, Competing uses, Irrigation water, Water allocation(Policy), Water management(Applied), Water distribution(Applied), Water levels, Water supply, Interstate rivers, Missouri, Watersheds(Basins), Legal aspects.
Identifiers: *Keyhole Reservoir, *Belle Fourche River, *Belle Fourche River Compact, *Missouri River Basin Project, National Environmental Policy Act, Environmental impact statement.

Wyoming's Keyhole Reservoir located on the Belle Fourche River was built by the Bureau of Reclamation for the specific purpose of supplemental irrigation. The Belle Fourche River Compact allocates the privilege of purchasing 10% of the reservoir capacity to Wyoming and the remaining 90% to South Dakota. South Dakotans have failed, however, to negotiate water contracts and the reservoir's principle use has been recreational. While such use is recognized as one of many authorized by the Missouri River Basin Project, the Bureau's main objective remains the collection of allocated reimbursable costs to which recreation contributes little. Thus, a conflict between consumptive, revenue-generating uses and nonconsumptive recreational use has arisen. Possible solutions to the user conflict include: (1) 'Mutual Water Administration' wherein moderate long-term industrial use is combined with recreational use; (2) 'Alternative Supply' in which water from a supplemental source is used to fulfill consumptive needs; (3) state purchase, although under the compact Wyoming may only purchase 10%; and (4) a legislative change to protect recreational use. The likelihood of effectuating any change, however, rests on the ability to convince the administrator that the changed use will increase the cost-benefit ratio without substantially affecting repayment, and the administrator's ability to convince Congress by the required impact statement that the changes will enhance both the quality of the environment and national economic development. (Moorhouse-Florida)
W77-03973

FORECASTINGS A LINE OF INVESTIGATIONS OF MEMBER COUNTRIES OF THE COUNCIL OF MUTUAL ECONOMIC ASSISTANCE IN THE AREA OF ENVIRONMENTAL HYGIENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W77-04016

NONPOINT SOURCES OF POLLUTION: A FEDERAL PERSPECTIVE,
Environmental Protection Agency, Washington, D. C. Div. of Water Planning.
For primary bibliographic entry see Field 5G.
W77-04017

THE INTEGRATION OF DESALINATION PLANT WITH EXISTING AUSTRALIAN WATER RESOURCES,
New South Wales Univ., Kensington (Australia). School of Nuclear Engineering.
For primary bibliographic entry see Field 3A.
W77-04018

HYGIENIC ASPECTS OF PROTECTION OF WATER RESOURCES IN THE LIGHT OF THE RESOLUTION BY THE CENTRAL COMMITTEE OF THE COMMUNIST PARTY OF THE SOVIET UNION AND THE COUNCIL OF MINISTERS ON 'MEANS OF PREVENTING POLLUTION OF THE VOLGA AND URAL RIVER BASINS BY UNTREATED SEWAGE', (IN RUSSIAN),
For primary bibliographic entry see Field 5G.
W77-04096

6F. Nonstructural Alternatives

ANALYSIS OF THE NATIONAL FLOOD INSURANCE ACT,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03693

LEGAL ASPECTS OF COASTAL ZONE MANAGEMENT IN ESCAMBIA AND SANTA ROSA COUNTIES, FLORIDA ('ESCAROSA'),
Miami Univ., Fla. School of Law.
For primary bibliographic entry see Field 6E.
W77-03697

ASSESSMENT OF FLOOD MANAGEMENT ALTERNATIVES AGAINST SOCIAL PERFORMANCE CRITERIA, PHASE II REPORT,
Institute of Public Administration, New York.
R. Mack.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-249 543, Price codes: A06 in paper copy, A01 in microfiche. Final Report to New England River Basin Commission, Boston, Mass., November 1975. 112 p, 9 ref, 3 append. NERBC 2. IG.

Descriptors: *River basins, *Flood protection, *Connecticut River, *Social impact, Management, Flood control, Floods, Assessments, Flood plain insurance, Floodwater, Social aspects, Connecticut.
Identifiers: *National Flood Insurance Program, *Connecticut River Basin, Flood management methods, Management alternatives, Social performance criteria, Basic utilities, Flood plain management.

The effect of alternative flood management methods on different people over a period of time was examined. The analysis was intended to provide a framework for evaluating management alternatives in the light of a comprehensive value system--one that views social impacts parallel with environmental and economic impacts. The analysis suggested how alternatives could be modified to reduce adverse impacts and enhance favorable ones. A novel approach was developed which went beyond dollar measures to basic utilities such as safety/stability, well-being of spirit/mind, intimacy, social belonging/participation, and material well-being. A taxonomy of nine such utilities was set in an explorative 'e-model' of consumer behavior addressed to optimizing total well-being. All benefits and costs were put on a hypothetical comparative basis. Checklists were presented for the impacts of the National Flood Insurance Program, of relocation of structures in flood plains and flood basins, of flood warning and flood-episode management systems, and of proposed nonstructural flood plain management alternatives. The checklists provided a framework to aid in assembling and applying detailed empirical in-

formation the evaluation and improvement of flood plain management plans for specified areas. (Roberts-ISWS)
W77-03774

THE NATIONAL FLOOD INSURANCE PROGRAM: EXPLANATION AND LEGAL IMPLICATIONS,
Federal Highway Administration, Washington, D.C. Office of General Counsel.
G. M. Tierney.
Urban Lawyer, Vol. 8, No. 2, p. 279-306, 1976. 86 ref.

Descriptors: *Flood plain insurance, *Flood plain zoning, *Legal aspects, *Legislation, Water law, Legal review, Riparian land, Flood control, Land use, Watershed management, Non-structural alternatives, Insurance, Institutional constraints, Local governments.
Identifiers: *National Flood Insurance Program.

Under an early version of the Flood Insurance Program, certain landowners could be liable for the imposition of legal sanctions even though they did all within their power to comply with the law, according to legal research aimed at identifying strengths and weaknesses of the program and legal questions raised by implementation of the program on the federal and local levels. Under the law, individuals who desired flood insurance but who were prevented from meeting land use standards by the unwillingness or inability of their local government officials to enter the program, have been nevertheless liable. An amendment to eliminate the sanctions, however, would thwart the purpose of the Flood Insurance Program to encourage adequate land use measures to protect flood prone areas. Also, permanent federal subsidies would be needed to compensate landowners against high actuarial rates they would be charged by insurance companies when no land use restrictions would be enforced. And without sanctions, local government officials would have no incentive to enter the program. A better amendment would be for Congress to assume direct federal control of land use in flood prone areas, with validity for the act under the Commerce Clause of the United States Constitution. (Harris-Wisconsin)
W77-03956

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL PROTECTION IN MEXICO AND CANADA,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 6E.
W77-03698

THE COSTS AND EFFECTS OF CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS IN THE ENVIRONMENT,
Hearings--Sub Comm on the Environment and the Atmosphere, Comm on Science and Technology, US House of Representatives, November 7, 10, 11, 12, 13, 14, and 17, 1975 p 1-1457. 1457 p.

Descriptors: *Water pollution effects, *Testing procedures, *Federal government, *Air pollution effects, *Path of pollutants, Climatology, Epidemiology, Thermal pollution, Environmental effects, Testing, Data collections, Agriculture, Pollutant identification, Toxins, Pollutants, Economic impact.
Identifiers: *Congressional hearings.

Congressional hearings were held to receive testimony on causes, effects and costs of low-level environmental pollution. Information submitted centered on effects on human health, agriculture, ecology, and climate. Difficulties in assessment noted included environmental complexity, interactions between pollutants, and applicability of testing and statistical results. Lack of information on baseline amounts of substances in the environment along with a scarcity of economic results of pollution and realistic standards for pollution sources have made conclusions difficult to reach. All witnesses agreed that additional funding is necessary for research, and that there is negligible data on the health effects of most pollutants. It will be necessary to reduce testing costs per substance and to decrease the time necessary for completion of such studies. More emphasis on epidemiological research and data was urged, and new techniques for this was discussed. Witnesses also agreed on the need for an examination of the administrative structure of regulatory agencies. For effects on agriculture, withnesses dwelt on the inability to measure and predict losses accurately. Climatic concerns centered on the effects of carbon dioxide, particle loading, thermal pollution, and the altered chemical nature of precipitation. Again the limited knowledge of consequences was noted. (Molloy-Florida)
W77-03701

FRYINGPAN--ARKANSAS PROJECT COLORADO, FINAL ENVIRONMENTAL STATEMENT,
Bureau of Reclamation, Washington, D. C
For primary bibliographic entry see Field 8A.
W77-03702

THE PROJECTED ECONOMIC IMPACT OF THE RICHARD B. RUSSELL DAM AND LAKE UPON SOUTH CAROLINA,
Clemson Univ., S. C. Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6B.
W77-03735

ELEMENTS OF QUALITY ASSURANCE IN ENVIRONMENTAL SURVEILLANCE,
Los Alamos Scientific Lab., N. Mex. Environmental Studies Group.
For primary bibliographic entry see Field 7A.
W77-03786

TESTS OF COAST GUARD DEVELOPED HIGH SEAS OIL RECOVERY SYSTEMS AT EPA OHMSETT,
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W77-03905

PHOTOGRAMMETRIC EXPERIMENTS ON NEARSHORE MIXING AND DIFFUSION,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 2L.
W77-03907

DEVELOPMENT OF AN OIL-WATER POLLUTION MONITORING SYSTEM,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 5A.
W77-03908

MARSH GAS FROM THE ATLANTIC COASTAL PLAIN,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2L.
W77-03913

EFFECTS OF WASTE WATER ON ESTUARINE ECOSYSTEMS,
Maryland Univ., Solomons. Chesapeake Biological Lab.
For primary bibliographic entry see Field 5C.
W77-03914

CONSTRUCTION IN THE COASTAL ZONE: A POTENTIAL USE OF WASTE MATERIALS,
Coastal Engineering Research Center, Fort Belvoir, Va.
S. J. Williams, and D. B. Duane.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-009 388, Price codes: A02 in paper copy, A01 in microfiche. Reprint No. CERC-Reprint-2-75, Reprint from: Marine Geology, Vol 18, p 1-15, 1975. 16 p, 8 fig, 20 ref.

Descriptors: *Waste disposal, *Construction materials, *Waste dumps, *Waste storage, *Resources development, Water resources, *Baseline studies, *Environmental effects.
Identifiers: Coastal zone, *New York Bight, Ocean dumping, Site selection, Waste materials utilization, Man-made islands.

The Inner New York Bight, at the head of the Hudson shelf channel, has been the site for ocean disposal of various waste products since at least 1888. Natural channel-like bathymetry expressed in 1845 is today a series of hills rising to within 12 m (40 ft.) of the water surface superimposed upon a broad lobate mound. This topographic inversion created over the past nine decades is attributable to disposal of materials (soils, sand, and stone) of varying composition generated during construction in the New York metropolitan area. Isopach maps, sea-floor profiles, seismic records, and vibratory cores show much of the fill has remained in place. Man-made islands proposed for the inner continental shelf for siting power, port, or recreational facilities will use large volumes of stable material for core fill, which could be waste materials such as those described. Effective regional coastal zone planning should recognize uses for past and future waste materials as such practices would conserve sand and gravel resources for other high-volume needs (shoreline nourishment and protection and construction aggregate) and alleviate some of the site-selection problems in land disposal of waste. (Sinha-OEIS)
W77-03916

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 1ST QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03917

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 2ND QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03918

AN ENVIRONMENTAL SURVEY OF EFFECTS OF DREDGING AND SPOIL DISPOSAL, NEW LONDON, CONNECTICUT. 3RD QUARTERLY REPORT.
National Marine Fisheries Service, Highlands, N.J. Middle Atlantic Coastal Fisheries Center.
For primary bibliographic entry see Field 5C.
W77-03919

APPLICATIONS OF ERTS IMAGERY AND SHIPBOARD OBSERVATIONS TO COASTAL ENVIRONMENTS STUDIES. PART I - HYPERSALINE ENVIRONMENTS, PART II - COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W77-03921

MODELING AND INFORMATION HANDLING IN ENVIRONMENTAL SCIENCE,
American Univ., Washington, D. C. Coll. of Public Affairs.
For primary bibliographic entry see Field 5G.
W77-03926

INSTITUTIONS AND OBJECTIVES ON THE WATER, ENERGY, ENVIRONMENT INTERFACE,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W77-03934

QUASI-PUBLIC GOODS: PRICING THE COMMONS,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 6A.
W77-03936

A NOTE ON EFFLUENT CHARGES AND MARKET STRUCTURE,
State Univ. of New York at Binghamton. Economic Growth Inst.
For primary bibliographic entry see Field 5G.
W77-03955

POLLUTION, WELFARE, AND ENVIRONMENTAL POLICY IN THE THEORY OF COMPARATIVE ADVANTAGE,
Northwestern Univ., Evanston, Ill. Center for Mathematical Studies in Economics and Management Science.
R. Pethig.
Journal of Environmental Economics and Management, Vol 2, No 3, p 160-169, 1976. 16 ref.

Descriptors: *Economic impact, *Foreign countries, *Foreign trade, *Environmental control, *Theoretical analysis, *Mathematical models, *Economics, Comparative benefits, Comparative costs, Equilibrium prices, Model studies, Export, United Nations, Governments, Political aspects, Welfare(Economics).
Identifiers: *Theorem of Comparative Advantage.

A simple two-sector general equilibrium economic model is used to demonstrate that certain well-known propositions of neoclassical trade theory can be applied to nations with pollution-generating industries. Results from use of the model are obtained not only under the assumption that the countries do not enforce any environmental policy, but also under the assumption that one or each country implements an environmental price and standard system. In particular, several versions of the Theorem of Comparative Advantage (TCA) with respect to environmental scarcity are derived, along with a theorem on welfare loses from trade and an emission charge equalization theorem. The theoretical work attempts to fill a gap in existing research, wherein there has not been explicit rationalization and qualification with a general equilibrium model of the proposition that TCA applies to trading economies with polluting industries, and that consequently, countries with relatively large environmental assimilative capacities should specialize in and export those commodities which are relatively pollution-intensive in their production. (Harris-Wisconsin)
W77-03958

EFFLUENT CHARGES AND LICENSES UNDER UNCERTAINTY,
Harvard Univ., Cambridge, Mass. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W77-03959

EXAMINATION OF ENVIRONMENTAL POLICIES USING PRODUCTION AND POLLUTION MICROPARAMETER DISTRIBUTIONS,
Tel-Aviv Univ. (Israel). Foerder Inst. for Economic Research.
E. Hochman, and D. Zilberman.
Working Paper No. 104, November 1975. 57 p. 16 fig., 4 tab., 4 ref., 1 append.

Descriptors: *Model studies, *Pollution abatement, *Pollution taxes(Charges), *Standards, Economic efficiency, Labor, Optimization, Mathematical models, Planning, Regulation, Governments, Industries, Industrial production.

A method to predict and compare the short-run aggregate output, pollution and labor input of a competitive industry facing various environmental policies is suggested. The basic model begins with a polluting industry that does not have the option of pollution abatement. Assuming that the labor output and pollution output ratios vary among the microunits of the industry, the aggregates are derived for systems supported by taxes and regulated by standards. Next the optimal properties of the two policy tools were compared. The results were demonstrated assuming Pareto distribution of the microparameters. This basic model was extended to include pollution abatement technologies, and then the problem was examined from the perspective of the Salter model. Results indicate that the tax supported pollution abatement system is more efficient, while the system supported by standards yields higher levels of output for a given threshold level of pollution. However, the system supported by standards also results in a decrease in the productivity of the industry, since by ignoring efficiency considerations, productive plants which are highly polluting are shut down while some inefficient plants are reopened. (Luedtke-Wisconsin)
W77-03961

GEOTHERMAL TECHNOECOSYSTEMS AND WATER CYCLES IN ARID LANDS,
Arizona Univ., Tucson. Office of Arid Lands Studies.
C. Duffield.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 091, Price codes: A10 in paper copy, A01 in microfiche. Arid Lands Resource Information Paper No 8, November, 1976. 202 p, 8 fig, 7 tab, 400 ref. OWRT W-197(5254)(1).

Descriptors: *Geothermal studies, *Arid lands, *Bibliographies, *Geology, *Technology, *Reviews, Engineering structures, Multiple purpose projects, Ecosystems, Industries, Exploration, Exploitation, Resources development, Comprehensive planning, Desalination, Electric power production, Environmental effects, Research and development, Water resources development, Thermodynamics, Energy conversion, Convection, Economics, Ecology, Limiting factors, Adaptation, Evolution, Succession, Niches, Competition, Distribution patterns, Heat transfer.
Identifiers: *Technoecology, *Imperial Valley, Technoecosystems, Technoorganisms, Salton trough, Developing countries.

Large, complex industrial systems are closely analogous to biological ecosystems and can be called 'technoecosystems'. This analogy has many profound implications for design, management, and comprehension of industrial civilizations and their components. Rapidly evolving technology for exploitation of geothermal resources (heat, fluids, and chemicals) is reviewed within the framework of technoecology. Water is vital to geothermal technoecosystems as heat storage and transfer medium, as coolant for thermodynamic cycles of power production and distillation, and as chemical reactant and solvent. In arid lands, fresh water can be an especially valuable output for agricultural, industrial, and municipal use; geothermal technoecosystems are carefully adapted to water availability and needs. Systems planned or established in arid developing regions and Imperial Valley, California, are presented as detailed case studies. Where resource conditions are favorable, geothermal technoecosystems can produce large amounts of power, water, space and process heat, and industrial chemicals in a short time. However, geothermal reserves are finite and nonrenewable at projected exploitation rates. For billions of years geothermal heat has driven dynamic geological ordering processes through a cascaded hierarchy of convection systems. Geothermal technoecosystems outcompete geological systems in heat extraction. Hence ever-deeper geothermal resource exploitation threatens geological systems of ever-larger scale with irreversible modification and possible extinction. Annotated bibliography is included.
W77-03966

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 2E.
W77-03974

FORECASTINGS A LINE OF INVESTIGATIONS OF MEMBER COUNTRIES OF THE COUNCIL OF MUTUAL ECONOMIC ASSISTANCE IN THE AREA OF ENVIRONMENTAL HYGIENE, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W77-04016

PREFERENCE MODELS OF ENVIRONMENTAL IMPACT,
R. L. Keeney.
Research Memorandum, RM-76-4, International Institute for Applied Systems Analysis, Laxenburg, Austria, January 1976. 21 p, 1 fig, 1 tab, 25 ref.

Descriptors: *Environmental control, *Water quality, *Preferences(Water rights), *Decision making, Evaluation, Fisheries, Forests, Pest control, Nuclear powerplants, Model studies, Systems analysis.
Identifiers: *Multiple objectives, *Preference models, *Environmental impact, *Multiattribute utility theory, Uncertainty, Impact model, Hazardous materials transport.

Environmental problems usually involve multiple conflicting objectives, large uncertainties concerning the possible environmental impact, and several individuals or groups whose preferences are very different, but yet very important in choosing an alternative. If one wishes to influence the decision-making process using analysis, the above issues should be addressed. One critical aspect, which is usually conducted informally, involves weighing the advantages and disadvantages of the possible impacts of the various alternatives by each of the interested parties. A multiattribute utility model, called a utility function, quantifies the preferences of an interested party in a manner convenient for integration with an impact model, so that formal evaluation of the alternatives is logical and straightforward. Using the utility function of the various interested individuals and groups, it is possible to examine the different preference structures and their implications to illuminate the conflicts, focus the discussion, generate creative alternatives, and promote constructive compromises. Herein, the basic ideas of multiattribute utility are presented and placed in the context of a decision-making framework. The manner in which it aids the analysis of environmental issues is discussed. Several problems having environmental components in which multiattribute utility was used are surveyed. These include siting nuclear

power facilities, developing fisheries, controlling a forest pest, examining energy policy, and transporting hazardous materials. (Bell-Cornell)
W77-04020

7. RESOURCES DATA

7A. Network Design

ELEMENTS OF QUALITY ASSURANCE IN ENVIRONMENTAL SURVEILLANCE,
Los Alamos Scientific Lab., N. Mex. Environmental Studies Group.
L. J. Johnson.
Available from the National Technical Information Service, Springfield, VA 22161 as CONF-750 967-17, Price codes: A02 in paper copy, A01 in microfiche. LA-UR-75-1915, 1975. 11 p. 2 ref. (Submitted to the proceedings of the 3rd Environmental Protection Conference, September 23-25, 1975, Chicago, Ill.). ERDA W-7405-eng-36.

Descriptors: *Monitoring, *Surveys, *Standards, *Reliability, *Variability, *Network design, Data collections, Sampling, Analytical techniques, Environmental control, Methodology.

Those elements of uncertainty associated with environmental monitoring important to accuracy, reproducibility, sensitivity, acceptability and cost effectiveness, along with the controls applicable to sample collection, handling, chemical analysis, measurement and data presentation, are discussed. Some of the sources of unrecognized uncertainty in making environmental measurements are identified with the intent that they can lead to a more quantitative understanding of specific uncertainties through an attempt to measure and report them with 'quality assurance' (defined as the creation of confidence in, or the allaying of doubts about the character of the environmemtal information in question). A broad are to which quality assurance information can contribute is that of making environmental data sets comparable between laboratories in order that general meaning may be drawn from the accumulated information. Several generalized elements of quality assurance required in surveillance programs are listed as well as the operational steps. The sources of uncertainty which have been identified in environmental monitoring and which contribute to the variability of the results are discussed as related to air, water and soil. Recommendations for developing and reporting environmental surveillance data are provided. (Auen-Wisconsin)
W77-03786

7B. Data Acquisition

ESTIMATING RELATIVE LEAF WATER CONTENT WITH A SIMPLE BETA GAUGE CALIBRATION,
Soil Conservation Service, Klamath Falls, Oreg.
R. P. Obrigewitsch, D. E. Rolston, D. R. Nielsen, and F. S. Nakayama.
Agronomy Journal, Vol. 67, No. 5, p 729-732, September-October 1975. 3 fig, 8 ref.

Descriptors: *Sugar beets, *Crop response, Moisture, Plant growth, Plant tissues, Calibration, Estimating, Measurement, Radiation.
Identifiers: Beta radiation, *Leaf water content.

Existing methods for periodically measuring plant water status require considerable instrumentation or time. A method is described that simplifies plant water measurement by providing a completely linear calibration between attenuated beta radiation through a plant leaf and its relative water content simply by measuring the radiation intensity through the leaf at only two water contents - full turgidity and complete dryness. (Skogerboe-Colo St)
W77-03635

THE TWO-AXIS METHOD: A NEW METHOD TO CALCULATE AVERAGE PRECIPITATION OVER A BASIN,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2B.
W77-03755

ESTIMATE OF THE SUITABILITY OF TELEVISION INFORMATION FROM METEOROLOGICAL METEOR SATELLITES FOR DETERMINING ICE CONDITIONS IN LAKES AND RESERVOIRS,
For primary bibliographic entry see Field 2C.
W77-03765

ANALYSIS OF SIX BROADBAND OPTICAL FILTERS FOR MEASURING CHLOROPHYLL-A AND SUSPENDED SOLIDS IN THE PATUXENT RIVER,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5A.
W77-03785

SOME PROBLEMS IN THE STUDY OF THE INUNDATION OF RIVER FLOOD PLAINS BY AEROSPACE METHODS,
For primary bibliographic entry see Field 4A.
W77-03847

HYDROLOGIC ASPECTS OF SPACE INVESTIGATIONS OF THE EARTH'S SURFACE (LITERATURE SURVEY),
V. V. Kupriyanov, and V. G. Prokacheva.
Soviet Hydrology, Selected Papers, No 1, p 13-27, 1975. 1 fig, 5 tab, 51 ref. Translated from Trudy Gossudarstvennogo Gidrologicheskogo Instituta, No 205, p 83-114, 1975.

Descriptors: *Remote sensing, *Hydrologic aspects, *Satellites(Artificial), *Reviews, Photography, Radar, Hydrology, Snow cover, Ice cover, Rivers, Publications, Lakes, Reservoirs, Watersheds(Basins), Soil moisture, Clouds, Cloud cover.
Identifiers: *Literature surveys.

In addition to ground based and aircraft (aero) methods, science is also provided now with remote space research methods that are being used increasingly in earth sciences. The rapid development of remote equipment and space carriers and the successful use of survey materials has led to the development of space techniques in earth sciences. Hydrology is one of the leading earth sciences, and, therefore, the interests of hydrology are also considered in all estimates of the possible uses of space surveys in environmental research. In economic computations of an operative satellite system for the study of natural resources in the United States, 20% (208 million dollars) of the total sum allocated to the needs of meteorology, oceanography, geology, geography, forestry, and agriculture (project) was assigned to hydrology. At the beginning, the foregoing possibilities were rather vague, but, at the present time, the major applications of space information in various earth science disciplines are fairly well defined. There is a relatively large number of articles on the applications of satellite information to purely hydrologic purposes. These articles are scattered in different journals and conference and symposium transactions and are lost in the general evaluation of the applicability of satellite surveys to environmental research. The purpose of this paper was to systematize the published data on the use of satellite information for hydrologic purposes. (Sims-ISWS)
W77-03848

USE OF SATELLITE SURVEY MATERIAL IN GLACIOLOGICAL INVESTIGATIONS,
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W77-03851

ERTS-1, A NEW WINDOW ON OUR PLANET,
Geological Survey, Reston, Va.
Available from the Supt. of Documents, GPO, Washington, DC 20402, Price $13.00. Professional Paper 929, 1976. 362 p, 256 fig, 2 tab, 147 ref. R. S. Williams, Jr., W. D. Carter, Ed.

Descriptors: *Remote sensing, *Natural resources, *Satellites(Artificial), *Aerial photography, *Infrared radiation, Surveys, Sediment transport, Path of pollutants, Land use, Environmental effects, Vegetation, Topography, Documentation, Reviews, Federal government, *Water resources, Monitoring, Pollutant identification, Lakes.
Identifiers: *ERTS-1.

The launch, on July 23, 1972, of the first Earth Resources Technology Satellite (ERTS-1) by the National Aeronautics and Space Administration was a major step forward in extending man's ability to inventory the Earth's resources and to evaluate objectively his impact upon the environment. ERTS spacecraft represent the first step in merging space and remote-sensing technologies into a system for inventorying and managing the Earth's resources. Examples presented in this book demonstrate ERTS' vast potential for inventorying resources, monitoring environmental conditions, and measuring changes. Such information is essential for the full evaluation of the Federal lands and determining their future use, as well as for improved planning of overall land use throughout the United States and the world. Ten bureaus of the U.S. Department of Interior have roles in the ERTS project. Nearly all of these participating bureaus are represented in almost 100 papers included in this book. Chapter 3 is entitled 'Applications to Water Resources' and contains 23 separate sections. (Woodard-USGS)
W77-03875

APPLICATIONS OF ERTS IMAGERY AND SHIPBOARD OBSERVATIONS TO COASTAL ENVIRONMENTS STUDIES. PART I - HYPERSALINE ENVIRONMENTS, PART II - COASTAL CIRCULATION ANALYSIS,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W77-03921

OPERATIONAL APPLICATIONS OF SATELLITE SNOWCOVER OBSERVATIONS AND LANDSAT DATA COLLECTION SYSTEMS OPERATIONS IN CENTRAL ARIZONA,
Geological Survey, Tucson, Ariz. Water Resources Div.
For primary bibliographic entry see Field 2C.
W77-03971

A METHOD FOR THE AUTOMATIC MEASUREMENT OF WAVE FREQUENCY,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2L.
W77-03981

7C. Evaluation, Processing and Publication

COMPUTER MODELING,
National Research Council of Canada, Ottawa, (Ontario). Div. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W77-03679

WATER RESOURCES DATA SYSTEM,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith, V. C. Pelton, and S. A. Bender.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 969, Price codes: A07 in paper copy, A01 in microfiche. Water Resources Series No. 61, July 1976. 136 p, 31 fig, 52 tab, 8 ref.

Descriptors: *Wyoming, *Computer programs, *Computer models, *Data collections, *Data storage and retrieval, Water quality, Climatology, Climatic data, Surface waters, Snow.
Identifiers: *Data systems, Water resource data systems.

The Water Resources Data System (WRDS) is a computerized system for storage, retrieval, and analysis of surface water, water quality, climatological, and snow course data. This report describes the kinds of data stored, methods of retrieval, kinds of analyses, how users can obtain data, and user costs on the current system.
W77-03728

THE APPLICATION OF HYMO TO STUDY AREAS OF SOUTHWESTERN WYOMING FOR SURFACE RUNOFF AND SOIL LOSS ESTIMATES,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 4A.
W77-03729

A WATER RESOURCES DATA MANAGEMENT SYSTEM FOR SOUTH CAROLINA,
Clemson Univ., S. C. Dept. of Civil Engineering.
A. G. Law.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 949, Price codes: A07 in paper copy, A01 in microfiche. South Carolina Water Resources Research Institute, Clemson, Completion Report, September 1975. 139 p, 33 ref, 3 append. S-011-SC.

Descriptors: Analytical techniques, *Computer models, *Computer programs, Data collections, Data processing, *Data storage and retrieval, *Information retrieval.

A data management system was developed to retrieve data with an areal retrieval system (based on STORET II) and a river mileage retrieval system (based on STORET I). Currently, precipitation and climatologic data, streamflow data (mean daily flows and annual flood flows) are available with a provision for groundwater data when available. A discussion of sources of programs and subroutines available for use is presented.
W77-03733

A PRELIMINARY STUDY OF THE MAGNITUDE, FREQUENCY AND DISTRIBUTION OF INTENSE RAINFALL IN NIGERIA,
Ibadan Univ. (Nigeria). Dept. of Geography.
For primary bibliographic entry see Field 2B.
W77-03756

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-I. COMPUTER MODEL AND ITS EVALUATION USING WIND-TUNNEL EXPERIMENTS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W77-03757

EVAPORATIVE COOLING OF A PARTIALLY-WET AND TRANSPIRING LEAF-II. SIMULATED EFFECT OF VARIATIONS IN ENVIRONMENTAL CONDITIONS, LEAF PROPERTIES, AND SURFACE WATER CHARACTERISTICS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 2D.
W77-03758

LARGESCALE RIPPLES OF THE LOWER WABASH RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W77-03761

A RECONNAISSANCE OF THE RECENT SEDIMENTS OF THE RANNS OF KUTCH, INDIA,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
For primary bibliographic entry see Field 2L.
W77-03762

THE EFFECTS OF AGRICULTURAL RUN-OFF AND SILTATION ON A NEW RECREATIONAL LAKE,
Illinois State Univ., Normal. Dept. of Biological Sciences; and Illinois State Univ., Normal. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W77-03766

SIMULTANEOUS DETERMINATION OF TOTAL, NON-CARBONATE AND CARBONATE WATER HARDNESS BY DIRECT POTENTIOMETRY,
Canada Centre for Insland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W77-03780

A COMPENDIUM OF LAKE AND RESERVOIR DATA COLLECTED BY THE NATIONAL EUTROPHICATION SURVEY IN THE NORTHEAST AND NORTHCENTRAL UNITED STATES.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W77-03784

HYBRID COMPUTER MODEL OF ST. VENANT EQUATIONS,
Department of Agriculture, Lethbridge (Alberta). Research Station.
For primary bibliographic entry see Field 2E.
W77-03832

PREOPERATIONAL AND OPERATIONAL HYDROTHERMAL FIELD DATA ACQUISITION AND ANALYSIS,
Karlsruhe Univ. (West Germany). Institut Fuer Hydromechanik.
For primary bibliographic entry see Field 5B.
W77-03837

AUGMENTATION OF 1968-1972 WINTER STORMS IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3B.
W77-03838

AN INVESTIGATION INTO THE EFFECTS OF FORESTRY PLANTATIONS ON THE WATER QUALITY OF UPLAND RESERVOIRS IN NORTHERN IRELAND,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
For primary bibliographic entry see Field 5B.
W77-03840

SPECTRAL ANALYSIS OF THE LONG-TERM OCEANOGRAPHIC TIME SERIES AT OCEAN WEATHER STATION 'P',
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W77-03843

A STUDY IN THE SLOPE WATER REGION SOUTH OF HALIFAX,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W77-03844

MEASUREMENTS OF WAVES IN SOUTHAMPTON WATER AND THEIR VARIATION WITH THE VELOCITY OF THE TIDAL CURRENT,
University of East Anglia, Norwich (England). School of Environmental Sciences.
For primary bibliographic entry see Field 2L.
W77-03856

CHEMICAL AND PHYSICAL DATA FOR THE FLAMING GORGE RESERVOIR AREA, UTAH AND WYOMING, 1973-75,
Geological Survey, Salt Lake City, Utah.
E. L. Bolke.
Utah Basic-Data Release No 27, 1976. 35 p, 1 fig, 3 tab, 11 ref.

Descriptors: *Water quality, *Chemial analysis, *Water analysis, *Reservoirs, *Basic data collections, Sampling, Sites, On-site data collections, Laboratory tests, Chemical properties, Water temperature, Physical properties, *Utah, *Wyoming, Pollutant identification.
Identifiers: *Flaming Gorge reservoir(Utha-Wyo).

Water-quality data for Flaming Gorge Reservoir (Utah and Wyoming) are presented for samples collected at 25 sites by the U.S. Geological Survey from August 1973 to October 1975. (Woodard-USGS)
W77-03881

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1975,
Geological Survey, Lincoln, Nebr.
Water-Data Report NE-75-1, July 1976. 469 p, 4 fig, 4 tab, 30 ref.

Descriptors: *Hydrologic data, *Surface waters, *Groundwater, *Water quality, *Nebraska, Streamflow, Flow rates, Gaging stations, Water levels, Observation wells, Lakes, Reservoirs, Chemical analysis, Sediments, Sampling, Sites.

Water resources data for the 1975 water year for Nebraska consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality in wells and springs. Included are discharge records for 140 gaging stations; stage and contents for 9 lakes and reservoirs; water quality for 43 gaging stations, 22 ungaged stations, 29 partial-record flow stations, and 173 wells; and water levels for 66 observation wells. Also included are 115 crest-stage partial-record stations and 26 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Nebraska. (Woodard-USGS)
W77-03885

GROUND-WATER LEVELS IN WYOMING, 1975,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
For primary bibliographic entry see Field 4B.

W77-03888

HYDROLOGIC UNIT MAP--1974, STATE OF COLORADO.
Geological Survey, Reston, Va.
Hydrologic Unit Map of Colorado, 1976. 1 sheet.

Descriptors: *Maps, *Hydrology, *Colorado, Water resources, Data collections, Planning, Hydrologic systems, Regions, Land resources.
Identifiers: *Hydrologic unit maps(Color), *Hydrologic boundaries, Subregions, Accounting units, Cataloging units.

This map and accompanying table show Hydrologic Units in Colorado that are basically hydrographic in nature. The Cataloging Units shown will supplant the Cataloging Units previously used by the U.S. Geological Survey in its Catalog of Information of Water Data (1966-72). The Regions, Subregions and Accounting Units are aggregates of the Cataloging Units. The Regions and Subregions are currently (1974) used by the U.S. Water Resources Council for comprehensive planning, including the National Assessment, and as a standard geographical framwork for more detailed water and related land-resources planning. The Accounting Units are those currently (1974) in use by the U.S. Geological Survey for managing the National Water Data Network. (Woodard-USGS)
W77-03893

WATER AVAILABILITY OF JEFFERSON COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala. Water Resources Div.
For primary bibliographic entry see Field 4A.
W77-03894

CHEMICAL HAZARDS RESPONSE INFORMATION SYSTEM FOR MULTIMODAL ACCIDENTS (CHRISMA) (A REEVALUATION OF CHRIS FOR ALL MODES OF TRANSPORTATION),
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W77-03903

TWO METHODS FOR ADDING INFORMATION TO THE RESOURCES MANAGEMENT PROCESS,
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6B.
W77-03935

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, SEVENTH VOLUME.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6A.
W77-03967

LEAST COST CONTROL STRATEGIES IN URBAN DRAINAGE DESIGN -- A DYNAMIC PROGRAMMING APPROACH,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W77-04007

APPLIED MATHEMATICAL MODELLING IN MARINE SCIENCE,
Liege Univ. (Belgium). Institut de Mathematique.
For primary bibliographic entry see Field 2L.
W77-04008

OPTIMAL SEQUENCING IN INSTALLING WASTEWATER TREATMENT PLANTS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Teoria dei Sistemi.
For primary bibliographic entry see Field 5D.
W77-04019

DEMONSTRATION OF A STATE WATER QUALITY MANAGEMENT INFORMATION SYSTEM,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
For primary bibliographic entry see Field 5G.
W77-04021

8. ENGINEERING WORKS

8A. Structures

ESTIMATED WATER BALANCE FOR THE PROPOSED HADITHA RESERVOIR ON THE EUPHRATES RIVER IN IRAQ,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 4A.
W77-03625

FRYINGPAN--ARKANSAS PROJECT COLORADO, FINAL ENVIRONMENTAL STATEMENT,
Bureau of Reclamation, Washington, D. C
Dept. of the Interior Report INT FES 75-43, 2 volumes, April 16, 1975. 1060 p, 90 fig, 40 tab, 9 append.

Descriptors: *River basin development, *Environmental effects, *Dam construction, *Hydroelectric plants, *Multiple-purpose projects, *Colorado, Irrigation, Water yield improvement, Water qquality, Recreation, Flood control, Dams, Fish, Wildlife, Flooding, Colorado River Basin, Salinity, Tunnels, Reservoirs, Engineering structures, Federal government, Sedimentation.
Identifiers: *Arkansas River.

The Fryingpan--Arkansas Project is a multiple-purpose project on the Arkansas River in Colorado designed to supply irrigation water, develop hydroelectric power, supply and improve the quality of domestic and industrial water, develop recreational facilities, and provide flood control. The project will include 6 storage dams and reservoirs, 18 diversion dams and structures, 10 tunnels, and 2 power plants. The project begins in a mountainous area and ends in the plains. The major environmental impact of the project is the inundation of approximately 11,000 acres of land with consequent loss of wildlife habitat. Adverse environmental effects include an annual loss of 70,000 acre-feet of water to the Colorado River basin states resulting in an increased salinity in the Colorado River and a loss of power production capability at 5 hydroelectric plants on the Colorado River. Alternatives considered include cessation of further development and development of alternate sources of water and power. (Capehart-Florida)
W77-03702

SUPERCRITICAL FLOW OVER SILLS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W77-03747

8B. Hydraulics

HYDRAULICS OF SURFACE BUOYANT JET,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
F. Engelund.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY9, Proceedings Paper 12409, p 1315-1325, September 1976. 5 fig, 3 ref, 2 append.

Descriptors: *Jets, *Buoyancy, *Density, *Entrainment, *Water pollution sources, Dispersion, Mixing, Hydraulics, Discharge(Water), Turbulence, Equations, Mathematical studies, Path of pollutants, Waste disposal.
Identifiers: *Richardson number, Surface buoyant jet, Density distribution.

The spreading of a jet discharge horizontally at the surface of a quiescent receiving water of slightly higher density was investigated, assuming that the bulk Richardson number is moderate. The derivation of the basic flow equation and conservation of mass were described briefly. Two different approximations were obtained with the perturbation theory. In the first-order approximation, the longitudinal inertia dominates, and similarity of the velocity profiles in different cross sections is assumed. The second-order approximation was formulated, and an exact solution of the equations was presented. The second-order solution explains observed features that are not described by the first-order approximation. The similarity of velocity profiles cannot, in general, be assumed except close to the outlet. (Singh-ISWS)
W77-03743

FLOW IN CORRUGATED PIPES,
Footscray Inst. of Tech., Victoria (Australia). Dept. of Civil Engineering.
R. J. Shipton, and H. R. Graze.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY9, Proceedings Paper No 12414, p 1343-1351, September 1976. 5 fig, 2 tab, 7 ref, 3 append.

Descriptors: *Pipe flow, *Roughness(Hydraulic), *Flow, *Laboratory tests, Pipes, Roughness coefficient, Hydraulics, Head loss, Velocity, Turbulent flow.
Identifiers: *Corrugated pipe.

The detailed measurement and analysis of the turbulent velocity distribution and friction loss data associated with the flow of water in a 100-mm diam corrugated plastic pipe were described. For the roughness geometry adopted, the friction factor-Reynolds number characteristic revealed a distinct peak in the initial stages of transition and fully turbulent flow region followed by a typical rising characteristic in the higher Reynolds number region. Velocity distributions were determined from pitot traverses. The resistance function evaluated therefrom correlates with a wall Reynolds number based on the true position of the logarithmic asymptote of the velocity profile for the fully rough zone of flow. (Humphreys-ISWS)
W77-03744

THEORETICAL MODEL OF RIVER ICE JAMS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 2C.
W77-03745

FLOW AT GRADE-BREAK FROM MILD TO STEEP SLOPES,
Los Angeles Dept. of Water and Power, Calif.
R. G. Weyermuller, and M. G. Mostafa.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY10, Proceedings Paper 12458, p 1439-1448, October 1976. 7 fig, 9 ref, 2 append.

Descriptors: *Backwater, *Flow profiles, Gradually varied flow, Hydraulic models, Open channel flow, Hydraulics, Flow measurement, Critical flow, Flow, Equations.
Identifiers: Rectangular channel, Aerated nappe, Critical depth.

An empirical equation was determined using dimensional analysis and experimental test data to determine the depth of flow at a grade-break in a rectangular channel where the slope changes from mild to steep. The ratio of the depth of flow at the grade-break to the critical depth of flow was found to depend largely upon the slope of the downstream reach. The ratio reached a minimum of 0.715 when the downstream slope was steep enough to produce clear separation of the flow with an aerated nappe. The upper limit of 1.0 was approached as the downstream slope approached critical. (Lee-ISWS)
W77-03746

SUPERCRITICAL FLOW OVER SILLS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Civil Engineering.
K. S. Karki.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY10, Proceedings Paper 12480, p 1449-1459, October 1976. 11 fig, 18 ref, 2 append.

Descriptors: *Channels, *Open channel flow, *Supercritical flow, *Weirs, Drag, Jets, Laboratory tests, Hydraulics, Hydraulic jump, Froude number.
Identifiers: *Sills, Drag coefficiency, Wake.

Experimental investigations were carried out to study the supercritical flow over a square section sill for all flow situations except the jump condition. The supercritical flow was categorized into two distinct types depending upon the ratio of the sill height to upstream depth and the Froude number. This classification also corresponded to the splashing and nonsplashing conditions. The stagnation, wake, and reattachment pressures were investigated. The flow conditions were explored at the point when the downstream face pressures and the bed pressures become negative. An almost constant drag coefficient value, obtained from the present experiments, substantiated the drag characteristics of bluff bodies in open channels. (Lee-ISWS)
W77-03747

RUNOFF FILES FOR FLOOD HYDROGRAPH SIMULATION,
Hydrocomp, Inc., Atlanta, Ga. Atlanta Regional Office.
For primary bibliographic entry see Field 2E.
W77-03748

AN ASSESSMENT OF TECHNIQUES FOR HYDROTHERMAL PREDICTION,
Massachusetts Inst. of Tech. Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W77-03768

MIXING OF SUBMERGED TWO-DIMENSIONAL BUOYANT JETS IN UNIFORM BODIES OF WATER IN THE ABSENCE AND PRESENCE OF WIND ACTION,
California Univ., Berkeley. Div. of Hydraulic and Sanitary Engineering.
S-L. Liu.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 094, Price code: A08 in paper copy, A01 in microfiche. Hydraulic Engineering Laboratory, Report HEL 23-5, June, 1976. 141 p, 28 fig, 7 tab, 21 ref. (California Water Resources Center Project UCAL-WRC-W-306).

Descriptors: *Mathematical models, *Computer programs, *Jets, *Winds, Mixing, *Flow characteristics, Water discharge, Waves(Water).
Identifiers: *Submerged buoyant jets.

The mixing and flow behavior of submerged buoyant jets, discharged from sources with no initial net horizontal momentum flux into bodies of water of uniform density in the absence and presence of wind action, have been studied. A mathematical model, based on the initial fluxes of buoyancy and momentum, was developed to help describe the buoyant jet behavior in stagnant water of infinite depth. This model was confined to a slot source discharging vertically. A numerical solution of the model in terms of the characteristic source parameters was provided. The results were applied to the finite depth case when the free surface has no effect. (Snyder-California, Davis)
W77-03828

GIUSEPPE VENTUROLI, PIONEER IN CHANNEL STUDIES,
Karlsruhe Univ. (West Germany). Institut fuer Hydromechanik.
R. Chevray.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY10, Proceedings Paper 12488, p 1533-1540, October 1976. 5 fig, 17 ref, 2 append.

Descriptors: *Backwater, *Biographies, *Scientific personnel, *Channels, *History, Hydraulic jump, Hydraulics, *Pipe flow, Resistance, Flow.
Identifiers: *Giuseppe Venturoli, Channel studies, Hydraulic history, Flow establishment, Inertia, Differential equation, Rectangular channels.

The technical biography of Giuseppe Venturoli was presented with emphasis on the novel ideas he introduced and which contributed to the development of the science of hydraulics. Venturoli analyzed and performed experiments on flow through pipes and established the resistance formula in much the same form as it is known today. Moreover, it was he who first analyzed correctly the inertial aspect of flow establishment and presented for the first time the elementary backwater differential equation for rectangular channels. (Roberts-ISWS)
W77-03833

AIR-ENTRAINMENT IN HIGH HEAD GATE CONDUITS,
Uttar Pradesh Irrigation Research Inst., Roorkee (India).
For primary bibliographic entry see Field 8C.
W77-03835

STABILITY OF CHANNEL BEDS BY AMORING,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
W. C. Little, and P. G. Mayer.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY11, Proceedings Paper 12519, p 1647-1661, November 1976. 4 fig, 3 tab, 12 ref, 3 append.

Descriptors: *Channel erosion, *Particle size, *Hydraulics, *Sediment distribution, *Sediment sorting, Flow characteristics, Shear drag, Laboratory tests, Model studies, Methodology, Hydraulic design, *Bank stability.
Identifiers: *Stable channel, *Armoring(Channels), Incipient motion.

At a certain flow velocity, coarse material accumulates on the channel bed surface. This accumulation is called armoring. This armored surface protects material just below the surface from being eroded out, thus forming a stable channel for that flow and lesser flows. The reported investigation was planned to determine quantitatively the effects of sediment gradation on channel armoring by conducting laboratory experiments with known original sediment distributions subjected to constant flow until sediment outflow ceased. Experimental results were used to develop empirical techniques to determine the following for a given logarithmic-normal sediment distribution and for given hydraulic flow conditions: (1) if the sediment bed would armor, and (2) in case it armors, the geometric mean diameter and standard deviation of the armored surface particles. The results can be used for designing stable channels in a given earth material by the proper choice of channel dimensions that affect hydraulic parameters. (Singh-ISWS)
W77-03836

INTRODUCTION TO GROUND-WATER HYDRAULICS--A PROGRAMED TEXT FOR SELF-INSTRUCTION,
Geological Survey, Reston, Va. Water Resources Div.
G. D. Bennett.
Available from Branch of Distribution, USGS, 1200 S. Eads St., Arlington, Va. 22202. Techniques of Water-Resources Investigations, Book 3, Chapter B2, 1976. 172 p, 52 ref.

Descriptors: *Groundwater movement, *Analytical techniques, *Darcys law, *Equations, *Groundwater resources, Hydrogeology, Water storage, Hydraulics, Aquifer characteristics, Training.
Identifiers: *Groundwater hydraulics, Self-instruction text.

The series of manuals on techniques describes procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and further subdivided into sections and chapters. This chapter is an introduction to the hydraulics of ground-water flow. With the exception of a few discussions in standard text format, the material is presented in programed form. Emphasis has been placed upon theory rather than application. Basic principles of ground-water hydraulics are outlined, their uses in developing equations of flow are demonstrated, representative formal solution are considered, and methods of approximate solution are described. At some points, regorous mathematical derivation is employed; elsewhere, the development relies upon physical reasoning and plausibility argument. (Woodard-USGS)
W77-03884

HYDROLOGIC EFFECTS OF HYPOTHETICAL EARTHQUAKE-CAUSED FLOODS BELOW JACKSON LAKE, NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
For primary bibliographic entry see Field 8E.
W77-03895

RUNOFF REGULATION FOR HYDRO-POWER AND ITS EFFECT ON THE OCEAN ENVIRONMENT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 2E.
W77-03974

COMPUTER MODELING OF ERODIBLE FLOOD CHANNELS AND DELTAS,
San Diego State Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03993

HYDRAULICS OF SLOPE EROSION BY OVERLAND FLOW,
Gifu Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03994

MULTIVARIABLE FLOOD LEVEL FREQUENCY DISTRIBUTIONS,
Dillon (M. M.), Ltd., Toronto (Ontario).
D. L. Strelchuk.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 102, No HY12, Proceedings Paper 12637, p 1737-1744, December 1976. 4 fig, 4 ref, 2 append.

Descriptors: *Flood frequency, *Frequency analysis, *Frequency waves, Probability, Water level fluctuations, Water levels, Wave pile-up, Waves(Water), Dikes, Hydrology, Distribution patterns, Graphical analysis.
Identifiers: *Multivariate analysis, Conditional probability, Statistical analysis.

A graphical procedure was outlined for the determination of discrete values of a multivariable frequency distribution of three independent variables, each with individual frequency distributions. The method was developed for the determination of the frequency of water levels at a dike structure due to the combined occurrence of adjacent channel flows, outlet lake level fluctuations, and wave action. The frequency distribution was defined as a function of the triple integral of the product of the individual marginal frequency distributions. A graphical solution for the integration was detailed. The integrand was rearranged to products of two functions according to the statistical principle of mutually exclusivity and was solved using a rectangular coordinate system defined by the individual frequency distributions. This method may be used to find the frequency distribution of any multivariable function of two or more independent variables with known frequency distributions. (Lee-ISWS)
W77-03996

STOCHASTIC MODELS OF SEDIMENT MOTION ON FLAT BED,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W77-03997

8C. Hydraulic Machinery

AIR -ENTRAINMENT IN HIGH HEAD GATE CONDUITS,
Uttar Pradesh Irrigation Research Inst., Roorkee (India).
H. R. Sharma.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 102, No. HY11, Proceedings Paper 12523, p 1629-1646, November 1976. 12 fig, 1 tab, 18 ref, 2 append.

Descriptors: *Air entrainment, *Sluice gates, *Hydraulic jump, *Open channel flow, *Hydraulics, Pressure conduits, Froude number, Laboratory tests, Model studies, Velocity, Air demand.
Identifiers: *Air vent, Free flow, Vena contracta.

For successful operation of high head gated conduits and for avoiding structured damage due to cavitation and vibration, an adequate supply of air is necessary through an air vent located downstream of the gate. Only empirical formulas have so far been developed for estimating the ratio of the volumetric flow rate of air to that of water from the Froude number of the flow. The paper presented suitable relationships and diagrams, based on systematic experiments backed by theoretical considerations, for predicting air demand. Comparison of experimental and prototype data indicated that the prototype behavior can be predicted satisfactorily from model results for all types of flow provided other important parameters are also taken into account. Conduit roughness was found to have no significant effect on air entrainment. Measurements of air velocity by means of high speed cinematography indicated that the velocity at the interface is much higher than the mean velocity of water flow and that air velocity distribution is far removed from being logarithmic. (Singh-ISWS)
W77-03835

8E. Rock Mechanics and Geology

HYDROLOGIC EFFECTS OF HYPOTHETICAL EARTHQUAKE-CAUSED FLOODS BELOW JACKSON LAKE, NORTHWESTERN WYOMING,
Geological Survey, Cheyenne, Wyo. Water Resources Div.
W. R. Glass, T. N. Keefer, and J. G. Rankl.
Water-Resources Investigations 76-77 (open-file report), July 1976. 32 p, 18 fig, 1 plate, 1 tab, 15 ref.

Descriptors: *Dam failure, *Flood damage, *Earthquakes, *Simulation analysis, *Hydraulic models, Reservoirs, Flood profiles, Regression analysis, Computer models, *Wyoming.
Identifiers: *Jackson Lake(Wyo), Probable flood inundation, Accelerated discharge, Grand Teton National Park.

Jackson Lake, located in Grand Teton National Park, Wyoming, is in an area of seismic instability. There is a possibility of flooding in the Snake River downstream from Jackson Lake Dam in the event of a severe earthquake. Hypothetical floods were routed 38 miles (61 kilometers) downstream from the dam for three cases: (1) Instantaneous destruction of the dam outlet structure, (2) instantaneous destruction of the entire dam, and (3) for waves overtopping the dam without failure of the dam. In each case, a full reservoir was assumed. Hydrographs for outflow from the reservoir for the two cases of dam failure were developed utilizing an accelerated discharge due to the travel of a negative wave through the reservoir, and Muskingum storage routing. For the case of waves overtopping the dam, a 10-foot (3-meter) wave was assumed to be propagated from the upstream end of the reservori. A multiple-linearization technique was used to route the flow through the reach. The model was calibrated from U.S. Geological Survey streamflow records. Most extensive flooding and largest water velocities would occur if the entire dam were destroyed; floods for the other two cases were smaller. An inundation map was prepared from channel conveyance curves and profiles of the water surface. (Woodard-USGS)
W77-03895

CONSTRUCTION IN THE COASTAL ZONE: A POTENTIAL USE OF WASTE MATERIALS,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 6G.
W77-03916

THE APPLICATION OF BOREHOLE GEOPHYSICS TO THE SELECTION AND MONITORING OF NUCLEAR WASTE DISPOSAL SITES,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 5E.
W77-03970

8G. Materials

INTERNAL TREATMENTS FOR BOILERS OPERATING ABOVE 1200 PSI,
Nalco Chemical Co., Oak Brook, Ill.
P. B. Christiansen, and C. R. Hoefs.
TAPPI Engineering Conference, Houston, October 4-7, 1976, Preprinted Proceedings Book I, (TAPPI, Atlanta, Ga.), p 140-142. 4 ref, 1 tab.

Descriptors: *Boilers, *Corrosion control, *Scaling, Water treatment, Industrial water, Pulp and paper industry, Chemical industry, Corrosion, Pressure.

The increasing use of high-pressure boilers (1200 psig and above) by industry has brought with it new challenges in the control of internal boiler scale and corrosion. The prevention of corrosion and scale deposits is discussed briefly, and two case histories are given illustrating how SCA (Scale Control Agent developed by Nalco Chemical Company) reduced scaling in paper mill and petrochemical plant boilers. (Witt-IPC)
W77-03803

WATER TREATMENT FOR BOILER OPERATING PRESSURES ABOVE 1200 PSIG,
Ecodyne Corp., Union, N. J. Graver Water Div.
For primary bibliographic entry see Field 3E.
W77-03805

REDUCTION OF DEPOSIT FORMATION IN HEAT EXCHANGERS (SNIZHENIE OSADKOOBRAZOVANIYA V TEPLOOBMENNOI APPARATURE),
L. N. Kraev, N. V. Glushchenko, K. G. Shulakova, O. P. Opolchennyi, and V. A. Gruzdis.
Gidroliznaya i Lesokhimicheskaya Promyshlennost, No. 6, p 26-27, 1976. 1 fig, 4 ref, 2 tab.

Descriptors: *Heat exchangers, *Corrosion control *Scaling, *Water treatment, Yeasts, Wastes, Industrial wastes, Water pollution sources, Steel, Hydrogen ion concentration, Effluents, Fermentation, Equipment, Corrosion, Industrial water.
Identifiers: *Fermentation industry.

The possibility of using residual liquor from yeast production, a waste of the fermentation industry, as a water additive to reduce scale formation on heat exchange equipment was investigated. Measurements were made of the amount of scale formed on steel plates immersed in water of high hardness and the same water containing 5-20% residual liquor, during boiling for 2 hr. Without the additive, the amount of deposit formed on 100 aq cm plate surface was 28.7 mg; it was reduced to 13, 3.4, 2.25, and 1.51 mg upon the addition of 5, 10, 15, and 20% residual liquor, respectively. At a water pH of 6.5 (addition of 10-15% liquor), there was no corrosion of the carbon steel. These results were fully confiremed in industrial tests in which the residual liquor was added to hydrolysis process water. (Stapinski-IPC)
W77-03808

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

THERMAL EFFECTS ON AQUATIC ORGANISMS, ANNOTATED BIBLIOGRAPHY OF THE 1975 LITERATURE.
Oak Ridge National Lab., Tenn. Ecological Sciences Information Center.
For primary bibliographic entry see Field 5C.
W77-03640

HYDROLOGIC ASPECTS OF SPACE INVESTIGATIONS OF THE EARTH'S SURFACE (LITERATURE SURVEY),
For primary bibliographic entry see Field 7B.
W77-03848

ERTS-1, A NEW WINDOW ON OUR PLANET,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7B.
W77-03875

GEOTHERMAL TECHNOECOSYSTEMS AND WATER CYCLES IN ARID LANDS,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 6G.
W77-03966

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, SEVENTH VOLUME.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 6A.
W77-03967

IRRIGATION EFFICIENCY, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Research and Technology, Washington, D. C.
For primary bibliographic entry see Field 03F.
W77-03968

SUBJECT INDEX

ABSORPTION
Partitioning and Uptake of Pesticides in Biological Systems,
W77-03659 5C

Uptake and Retention of Kuwait Crude Oil and its Effects on Oxygen Uptake by the Soft-Shell Clam, Mya Arenaria,
W77-04026 5C

Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

ACCIDENTS
Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

ACCRETION (LEGAL ASPECTS)
Acquisition of Property (Islands).
W77-03723 6E

ACID PRECIPITATION
Waterfowl and Acid Precipitation in Norway, (In Danish),
W77-03841 5C

ACTIVATED SLUDGE
Design and Operational Criteria for Thickening of Biological Sludges,
W77-03734 5D

Effect of Dyes Used in the Textile Industry on the Purification of Effluents by the Activated Sludge Process (Wplyw niektorych barwnikow stosowanych w przemysle wlokienniczym na oczyszczanie sziekow osadem czynnym),
W77-03821 5D

Biological Effluent Clarification in the Paper Mill Circulation System (Biologische Abwasseraufbereitung im Kreislauf einer Papierfabrik),
W77-03824 5D

Phosphorus Removal from Wastewater,
W77-03867 5D

Device for Purifying Sewage,
W77-03869 5D

ADMINISTRATION
Water Pollution Control Administration, A Memorandum Report on a Reconnaissance Study.
W77-03684 5G

ADMINISTRATIVE AGENCIES
Section 208 Program Review, (Environmental Protection Agency), (Draft).
W77-03686 5D

State Administration Generally (Powers and Duties of the Department of Water Resources).
W77-03704 6E

ADMINISTRATIVE REGULATIONS
BPT: Consider the Alternatives (Best Practical Treatment Criterion).
W77-03690 5D

Contingency Plan for Spills of Oil and Hazardous Materials for Inland Waters of Region III.
W77-03700 5G

ADSORPTION
The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

Adsorption of C14-DDT to Particle Surfaces,
W77-03658 5B

ADSORPTION ISOTHERMS
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

ADVECTION
Evaporation and Advection I: Evaporation from Extensive Homogeneous Surfaces,
W77-03859 2D

AEOLIAN SOILS
The Production and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

AERATED LAGOONS
Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

AERATION
Tall Order in Waste Treatment,
W77-03602 5D

Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

AERIAL PHOTOGRAPHY
ERTS-1, A New Window on Our Planet,
W77-03875 7B

Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

AEROBIC BACTERIA
Tall Order in Waste Treatment,
W77-03602 5D

AEROMONADS
The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

AEROMONAS-PUNCTATA
The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

AEROSOLS
The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

AGGREGATE BACTERIA
Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

AGING STUDIES (OIL)
Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

AGRICULTURAL RUNOFF
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

AGRICULTURE
Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Intensity of Rainfall in Clermone-Ferrand, (In French),
W77-04032 2B

AGROBACTERIUM-STELLULATUM
A Study on the Influence of Salinity Fluctuations upon the Bacterial Flora of the Lagoon Cienaga Grade de Sante Marta (Colombia) and the Adjacent Coastal Region, (In German),
W77-04076 5B

AIR ENTRAINMENT
Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

AIR POLLUTION
A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

Waterfowl and Acid Precipitation in Norway, (In Danish),
W77-03841 5C

Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

AIR POLLUTION EFFECTS
The Costs and Effects of Chronic Exposure to Low-Level Pollutants in the Environment,
W77-03701 6G

AIR TEMPERATURE
Lake Erie Terrestrial Radiation,
W77-03858 2H

AIR VENT
Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

ALASKA
Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

Water Availability, Quality, and use in Alaska.
W77-03883 6B

ALBEDO
Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

ALCOHOLS
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

ALGAL GROWTH POTENTIAL
Eutrophication and Fish Toxicity Potentials in a MultipleUse Subtropical Reservoir,
W77-03825 5C

ALGORITHMS
Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

ALKALINE SOILS
Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

ALTERATION OF FLOW
State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

ALTERNATIVE PLANNING
Physical and Economic Parameters for Planning Regional Wastewater Treatment Systems,
W77-04010 5D

AMINES
Toxicological Effects of Diethylnitrosamine (DENA) in Guppies (Lebistes Reticulatus), (In German),
W77-04100 5C

AMMONIA
Purifying and Regenerating Gaseous and Fluid Phase Effluents -- Such as Ammonia Mixtures from Wool Processing, Mercerising Etc.
W77-03617 5D

The Effect of Ammonia Exposure on Gill Structure of the Rainbow Trout (Salmo Gairdneri),
W77-04056 5C

AMMONIUM COMPOUNDS
Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

AMPHIPOD GAMMARUS OCEANICUS
Effects of Oil on the Amphipod Gammarus Oceanicus,
W77-03777 5C

AMPHIPODA
Effects of Oil on the Amphipod Gammarus Oceanicus,
W77-03777 5C

ANAEROBIC TREATMENT
Method and Apparatus for Anaerobic Fermentation,
W77-03873 5D

ANALYTICA TECHNIQUES
Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

ANALYTICAL TECHNIQUES
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

Sulphide Measurement Using Ammonium Molybdate,
W77-03657 5A

Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

Introduction to Ground-Water Hydraulics--A Programed Text for Self-Instruction,
W77-03884 8B

An Oil Slick Sampling System,
W77-03909 5A

Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

ANTIBIOTICS (PESTICIDES)
Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici),
W77-03603 5D

ANTIMONY
Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

APPROPRIATION
Taylor V Board of Levee Commissioners of the Tensas Basin Levee District (A Taking for Levee Purposes).
W77-03707 6E

AQUATIC ENVIRONMENT
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

AQUATIC HABITATS
Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

AQUATIC INSECTS
The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

AQUATIC LIFE
Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

AQUATIC MACROPHYTES
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

AQUATIC PLANTS
Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

AQUATIC WEED CONTROL
Weed Control and the Environment, (In French),
W77-04041 5B

AQUATIC WEEDS
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

AQUIFER CHARACTERISTICS
Preliminary Digital Model of Ground-Water Flow in the Madison Group, Poweder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

AQUIFERS
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

Ground-Water Pollution Near a Landfill,
W77-03991 5B

Unsaturated Zone and Vertical-Flow Components in Draining Unconfined Formations,
W77-04000 2F

An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

ARCTIC
A Canadian Arctic Fjord with Some Comparisons to Fjords of the Western Americas,
W77-03977 2L

Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

Storm Surges in the Southern Beaufort Sea,
W77-03986 2L

ARCTIC COD
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected

Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

ARID LANDS
Desertification: Symptom of a Crisis,
W77-03737 4C

The Consequences of Fooling Mother Nature,
W77-03738 2B

Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

Segments of a Vicious Circle: Land Degradation and Water Resources,
W77-03740 4C

Desertification and the Salinity Problem in Australia,
W77-03741 4C

Desert Repaired in Southeastern Oregon: A Case Study in Range Management,
W77-03742 4D

Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

ARIZONA
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

ARKANSAS RIVER
Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

ARKANSAS-WHITE-RED REGION
Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

ARMORING (CHANNELS)
Stability of Channel Beds by Amoring,
W77-03836 8B

AROCLORS
Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

AROMATIC HYDROCARBONS
Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

ARSENIC
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

ARSENIC COMPOUNDS
Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

ARTESIAN AQUIFERS
Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

ARTESIAN WELLS
State Administration Generally (Powers and Duties of the Department of Water Resources).
W77-03704 6E

ARTIFICIAL LAKES
Artificial and Natural Lakes,
W77-03694 6E

ARTIFICIAL WATERCOURSES
Kattor V Sabatini (No Right of Diverting Surface Water by Artificial Channel).
W77-03714 6E

ATLANTIC COASTAL PLAINS
Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

ATLANTIC COD
Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

ATLANTIC OCEAN
Mean Circulation in Shallow Seas,
W77-03753 2L

Nearshore Currents Off Long Island,
W77-03754 2L

Measurements of a Small Near-Bottom Cyclonic Circulation Near the Gulf Stream Axis,
W77-03842 2L

A Study in the Slope Water Region South of Halifax,
W77-03844 2L

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Spectrum of Small-Scale Oceanic Temperature Gradients,
W77-03979 2L

Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

ATMOSPHERIC DUST
Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

ATOMIC ABSORPTION SPECTROMETRY
Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

AUSTRALIA
Desertification and the Salinity Problem in Australia,
W77-03741 4C

The Integration of Desalination Plant with Existing Australian Water Resources,
W77-04018 3A

AUTOMATIC CONTROL
A Scheme for Effective Control of Effluent pH,
W77-03802 5D

AUTOMATIC MEASUREMENT
A Method for the Automatic Measurement of Wave Frequency,
W77-03981 2L

AUTOMATION
An Automatic, Continuous, Modular Wastewater Monitoring System,
W77-03801 5A

AVAILABLE WATER
Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

Water Availability, Quality, and use in Alaska.
W77-03883 6B

BACCILARIOPHYCEA
Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

BACKWATER
Flow at Grade-Break from Mild to Steep Slopes,
W77-03746 8B

Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region),
W77-03989 4A

BACTERIA
Microbial Dealings with Heavy Metals,
W77-03666 5C

Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

Bacterial Mobilization of Mercury in Chesapeake Bay,
W77-03670 5C

Investigations on the Influence of Salt Concentration on the Activity of Bacterial Populations from Fresh and Waste Waters, (In German),
W77-04065 5C

Studies on the Recurrence of Bacterial Flora in Drinking Water After Ozonization, (In German),
W77-04074 5F

Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

A Study on the Influence of Salinity Fluctuations upon the Bacterial Flora of the Lagoon Cienaga Grade de Sante Marta (Colombia) and the Adjacent Coastal Region, (In German),
W77-04076 5B

Bacterial Assimilation of Organic Matter in Waters with Various Pollution Levels, (In Russian),
W77-04081 5B

Microcalorimetric Investigations in Polluted Surface Waters, (In German),
W77-04091 5A

The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

Microbiological Characteristics of the Ros/ River and Some of Its Tributaries, (In Russian),
W77-04093 5C

BACTERIA

The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

Behavior of Pathogenic and Sanitary-Indicator Bacteria Under Conditions of Water Pollution by Organophosphorus Pesticides, (In Russian),
W77-04099 5C

BACTERIAL ASIMILATION

Bacterial Assimilation of Organic Matter in Waters with Various Pollution Levels, (In Russian),
W77-04081 5B

BACTERICIDES

Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

BACTERIOLOGICAL STUDIES

Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian),
W77-04084 5G

BALTIC SEA

Mass and Salt Transfers and Halocline Depths in an Estuary,
W77-03751 2L

On the Description of the Hydrographic State and the Circulation in the Baltic Deep Water,
W77-04006 2L

Comparative Investigations on the Self-Purification in Polluted Waters of Different Salinities, (In German),
W77-04098 5G

BANK STABILITY

Stability of Channel Beds by Amoring,
W77-03836 8B

BASE COURSES

Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

BASELINE STUDIES

Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

An Oil Slick Sampling System,
W77-03909 5A

Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 1st Quarterly Report.
W77-03917 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

An Assessment of the Pollution of Cornish Coastal Waters,
W77-04061 5B

BASIC DATA COLLECTIONS

Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

BASINS

The Two-Axis Method: A New Method to Calculate Average Precipitation Over A Basin,
W77-03755 2B

BAYESIAN APPROACH

Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

BAYESIAN METHODS

Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

BAYS

The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

BDELLOVIBRIO-BACTERIOVORUS

Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

BEAUFORT SEA

Distribution of Low-Molecular-Weight Hydrocarbons in Southern Beaufort Sea,
W77-03793 5B

Storm Surges in the Southern Beaufort Sea,
W77-03986 2L

BEAVER RIVER VALLEY (UTAH)

Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

BED FORMS

Rollers and Ripples in Sand, Streams and Sky: Rhythmic Alteration of Transverse and Longitudinal Vortices in Three Orders,
W77-03998 2J

BED LOAD

Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

BEDS UNDER WATER

Ownership of Submerged Lands in Florida,
W77-03695 6E

BELGIUM

Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

BELLE FOURCHE RIVER

Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

BELLE FOURCHE RIVER COMPACT

Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

BENEFIT MAXIMIZATION

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

BENTHIC FLORA

Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

BENTHO

Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

BIBLIOGRAPHIES
Thermal Effects on Aquatic Organisms, Annotated Bibliography of the 1975 Literature.
W77-03640 5C

Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

Irrigation Efficiency, A Bibliography, Volume 2.
W77-03968 3F

BIO-ACCUMULATION MODELS
On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
W77-03680 5B

BIOACCUMULATION (XENOBIOTICS)
Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

BIOASSAY
Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian),
W77-04097 5C

BIOASSAYS
Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

BIOCENSES
Change of Biocenoses in Artificial Bodies of Water Due to Human Intervention, (In Russian),
W77-03618 5C

BIOCHEMICAL OXYGEN DEMAND
Nestle and Pollution Control,
W77-03607 5D

Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

In-Plant, Outside Pollution Evils, Energy Saving Top AATCC Concerns.
W77-03620 5G

A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

BIOCHEMISTRY
Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

BIODEGRADATION
Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

Microbial Processes of Phenol Degradation in the Volga and its Reservoirs, (In Russian),
W77-04064 5C

BIOGRAPHIES
Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

BIOINDICATORS
Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

Some Problems of Sanitary Microbiology, (In Russian),
W77-04085 5A

Behavior of Pathogenic and Sanitary-Indicator Bacteria Under Conditions of Water Pollution by Organophosphorus Pesticides, (In Russian),
W77-04099 5C

BIOLOGICAL COMMUNITIES
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

Coastal Marine Pollution and Fish,
W77-03902 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 1st Quarterly Report.
W77-03917 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

BIOLOGICAL TREATMENT
Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

Purification of Residual Liquor from Yeast Production (Ochistka posledrozhzhevoi brazhki),
W77-03811 5D

Biological Effluent Clarification in the Paper Mill Circulation System (Biologische Abwasseraufbereitung im Kreislauf einer Papierfabrik),
W77-03824 5D

Adsorption Biooxidation Treatment of Waste Waters to Remove Contaminants Thereform,
W77-03865 5D

Method and Apparatus for Anaerobic Fermentation,
W77-03873 5D

BIOMASS
Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

BIOOXIDATION
Adsorption Biooxidation Treatment of Waste Waters to Remove Contaminants Thereform,
W77-03865 5D

BLEACHING WASTES
Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

Chlorine-Based Bleachery Effluent Treatment,
W77-03806 5D

BOARD MILLS
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

BODIES OF WATER
Deleterious Substances in Streams.
W77-03721 6E

BOILER FEED WATER
Water Treatment for Boiler Operating Pressures Above 1200 PSIG,
W77-03805 3E

BOILER FUEL OIL
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

BOILERS
Internal Treatments for Boilers Operating Above 1200 PSI,
W77-03803 8G

BOREHOLE CAMERAS
The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

BOREHOLE GEOPHYSICS
The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

BORON
Experimental and Field Studies in Hygienic Assessment of Drinking Water Containing Boron, (In Russian),
W77-04033 5G

BOTTOM SEDIMENTS
Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

BOUNDARIES (PROPERTY)
Acquisition of Property (Islands).
W77-03723 6E

BOUNDARY DISPUTES
The Deltona Corporation V Board of Trustees of the Internal Improvemenr Trust Fund.
W77-03708 6E

BOUNDARY LAYERS
Nearshore Currents Off Long Island,
W77-03754 2L

BOWEN RATIO
Evaporation and Advection I: Evaporation from Extensive Homogeneous Surfaces,
W77-03859 2D

BRACKISH WATER
A Study on the Influence of Salinity Fluctuations upon the Bacterial Flora of the Lagoon Cienaga Grade de Sante Marta (Colombia) and the Adjacent Coastal Region, (In German),
W77-04076 5B

BRANCH AND BOUND ALGORITHM
Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

BRINE SHRIMP
Acclimation and Tolerance of Artemia Salina to Copper Salts,
W77-04044 5C

Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

BRINE SHRIMP EGGS
Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

BRITISH COLUMBIA
Mass and Salt Transfers and Halocline Depths in an Estuary,
W77-03751 2L

Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

Tidal Currents and Estuarine-Type Circulation in Johnstone Strait, British Columbia,
W77-03846 2L

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

BROOK TROUT
Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

BROWN TROUT
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

BUOYANCY
Hydraulics of Surface Buoyant Jet,
W77-03743 8B

BYPRODUCTS
Utilization of the Spent Sulfite Liquor Components in the Pekilo Protein Process and the Influence of the Process upon the Environmental Problems of a Sulfite Mill,
W77-03816 5D

CACTI
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

CADDISFLIES
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

CADMIUM
Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

CALIFORNIA
Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

The California Coastal Plan (A Symposium).
W77-03688 6E

California Water Law in Perspective,
W77-03689 6E

General State Powers over Water.
W77-03703 6E

State Administration Generally (Powers and Duties of the Department of Water Resources).
W77-03704 6E

Klamath River Basin Compact.
W77-03705 6E

Oregon- California Goose Lake Interstate Compact.
W77-03706 6E

Marine Sanitation.
W77-03720 6E

A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

The Decomposition of Leaves in Two Southern California Streams,
W77-03829 5B

Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

Relationships of Epibiotic Fouling and Mortalities of Eggs of the Dungeness Crab (Cancer Magister),
W77-04040 5C

Mercury in Tissues of Mussel Off Southern California,
W77-04060 5C

CALIFORNIA COASTAL PLAN
The California Coastal Plan (A Symposium).
W77-03688 6E

CALORIMETRY
Microcalorimetric Investigations in Polluted Surface Waters, (In German),
W77-04091 5A

CAMPHOR
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

CANADA
Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

The Ottawa River Project,
W77-03683 5B

Environmental Protection in Mexico and Canada,
W77-03698 6E

Experiments with the Surface Heat and Water Budgets of the Canadian Middle North,
W77-03749 2D

An Historical Sketch of Physical Oceanography in Canada,
W77-03759 2L

Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

A Canadian Arctic Fjord with Some Comparisons to Fjords of the Western Americas,
W77-03977 2L

Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

Numerical Model Studies of the Tides Between Vancouver Island and the Mainland Coast,
W77-03984 2L

Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

Storm Surges in the Southern Beaufort Sea,
W77-03986 2L

Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

Hydrocarbons in a Wilderness Lake,
W77-04048 5B

Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

CANAL CONSTRUCTION
Canal Authority V Ocala Manufacturing Ice and Packing Company (Construction of Cross Florida Barge Canal).
W77-03715 6E

CANAL SEEPAGE
Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

CANALS
Canal Authority V Ocala Manufacturing Ice and Packing Company (Construction of Cross Florida Barge Canal).
W77-03715 6E

Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

CAPILLARY ACTION
Reverse Osmosis for the Treatment of Metal Waste Solutions,
W77-03610 5D

CAPITELLA-CAPITATA
Study on the Long-Term Effects of Some Detergents on the Sequence of Development of the Sedentary Polychaete, Capitella Capitata (Fabricius), (In French),
W77-04067 5C

CARBOHYDRATE METABOLISM
The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates,
W77-04030 5C

CARBONATES
Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

CATANIA (ITALY)
Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian),
W77-04084 5G

CATION ADSORPTION
Dynamics of Interaction of Cations and Fulvic Acid,
W77-03662 2K

CATIONS
Dynamics of Interaction of Cations and Fulvic Acid,
W77-03662 2K

CENTRAL ARIZONA PROJECT
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

CENTRAL U.S.
A Compendium of Lake and Reservoir Data Collected by the National Eutrophication Survey in the Northeast and Northcentral United States.
W77-03784 5C

CENTRAL US
Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

CENTRIFUGATION
Continuous Bowl-Type Centrifuges for the Clarification and Dehydration of Sludges from the Paper Industry (Centrifugeuses Continues A Bol Plein Pour Clarification et Deshydration des Boues Dans L'Industrie Papetiere).
W77-03613 5D

CEPHALOPODA
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

CHANNEL CATFISH
Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

CHANNEL EROSION
Stability of Channel Beds by Amoring,
W77-03836 8B

CHANNEL FLOW
State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

CHANNELS
Supercritical Flow Over Sills,
W77-03747 8B

Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

CHAROPHYTA
Radioecological Study of Charophyta, (In Russian),
W77-04068 5C

CHELANT-SURFACTANTS
Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

CHELATION
Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

CHEMIAL ANALYSIS
Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

CHEMICAL HAZARDS
Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

CHEMICAL INDUSTRY
Tall Order in Waste Treatment,
W77-03602 5D

Chemical-Industry Costs of Water Pollution Abatement,
W77-03604 5D

Evaluation of Wastewater Treatment Facilities.
W77-03619 5D

CHEMICAL OXYGEN DEMAND
Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

CHEMICAL PROPERTIES
Adsorption of C14-DDT to Particle Surfaces,
W77-03658 5B

CHEMICAL WASTES
Chemical-Industry Costs of Water Pollution Abatement,
W77-03604 5D

Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

Current Problems of Hygienic Standardization of New Chemical Substances, (In Russian),
W77-04015 5C

CHESAPEAKE BAY
The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

Bacterial Mobilization of Mercury in Chesapeake Bay,
W77-03670 5C

Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

Some Effects of Petroleum on Estuarine and Marine Micro-Organisms,
W77-04063 5C

CHICAGO-CALUMET HARBOR SHORELINE
Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

CHINA CLAY
The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

CHLORDANE
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

CHLORELLA
Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian),
W77-04097 5C

CHLORIDES
Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

CHLORINATED HYDROCARBON PESTICIDES
Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

Trends of PCB and DDT in Fish and Aquatic Birds,
W77-03677 5B

The Distribution of Short-Chain Halogenated Aliphatic Hydrocarbons in Some Marine Organisms,
W77-04051 5C

CHLORINATED HYDROCARBONS
Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

CHLORINE
Acute Toxicity of Residual Chlorine in Wastewater to Coho Salmon (Oncorhynchus Kisutch) and Some Resultant Hematologic Changes,
W77-04027 5C

Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

CHLOROPHYLL
Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

CHLOROPHYTA
Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

Primary Production of Green Filamentous Algae from the Kiev Reservoir, (In Russian),
W77-04070 5C

Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian),
W77-04097 5C

CHOWAN RIVER ESTUARY (NC)
A Mathematical Model for Simulating Water Quality Under Non-Steady State Conditions,
W77-03831 5B

CHOWAN RIVER (NC)
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

CHUKCHI SEA
Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

CILIATES
Concentration of Organic Substances in Water as a Factor Controlling the Occurrence of Some Ciliate Species,
W77-03839 5C

CIRCULATION
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

On the Description of the Hydrographic State and the Circulation in the Baltic Deep Water,
W77-04006 2L

CITIES
Protection of Water Supply.
W77-03719 6E

Condemnation of Land and Water Rights.
W77-03726 6E

CLAMS
Uptake and Retention of Kuwait Crude Oil and its Effects on Oxygen Uptake by the Soft-Shell Clam, Mya Arenaria,
W77-04026 5C

Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

CLASSIFICATION (BIOLOGICAL)
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

CLAYS
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

CLEAR-CUTTING
Alteration of Water Regulating and Protective Features of the Forest Under Influence of Forestry Measures, (In Russian),
W77-04002 4C

CLIMATOLOGY
The Consequences of Fooling Mother Nature,
W77-03738 2B

CLOUD SEEDING
Augmentation of 1968-1972 Winter Storms in New Mexico,
W77-03838 3B

CLOUDBURSTS
A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
W77-03756 2B

COAL MINE WASTES
Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

COAL MINES
An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

COAL PILES
Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

COASTAL AQUIFERS
An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

COASTAL AREAS
The California Coastal Plan (A Symposium).
W77-03688 6E

COASTAL LAKES
Meromictic Mechanisms in a Coastal Lake, (In Finnish),
W77-04071 5C

COASTAL MARSHES
Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

COASTAL PROCESSES
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

COASTAL STRUCTURES
Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

COASTAL ZONE
Coastal Marine Pollution and Fish,
W77-03902 5C

COASTAL ZONE MANAGEMENT
Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

Legal Aspects of Coastal Zone Management in Escambia and Santa Rosa Counties, Florida ('Escarosa'),
W77-03697 6E

Coastal Zone Management in Florida,
W77-03699 6E

COASTAL ZONE MANAGEMENT ACT
Coastal Zone Management in Florida,
W77-03699 6E

COASTAL ZONE MANAGEMENT (TEX)
Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

COASTLINES
The California Coastal Plan (A Symposium).
W77-03688 6E

COASTS
Coastal Zone Management in Florida,
W77-03699 6E

An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

Applied Mathematical Modelling in Marine Science,
W77-04008 2L

COD
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

COHO SALMON
Acute Toxicity of Residual Chlorine in Wastewater to Coho Salmon (Oncorhynchus Kisutch) and Some Resultant Hematologic Changes,
W77-04027 5C

Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

COLD REGIONS
Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

COLIFORM BACTERIA
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

COLIFORMS
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

COLONIAL AUK
Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

COLOR
Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

COLORADO
Legal Constraints on Urban Water Systems,
W77-03692 3D

Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

Water Resources of El Paso County, Colorado,
W77-03890 6D

Hydrologic Unit Map--1974, State of Colorado.
W77-03893 7C

COLORADO RIVER BASIN
Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

COLORIMETRY
Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

COLUMBIA
A Study on the Influence of Salinity Fluctuations upon the Bacterial Flora of the Lagoon Cienaga Grade de Sante Marta (Colombia) and the Adjacent Coastal Region, (In German),
W77-04076 5B

COLUMBIA RIVER
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

COMBINED SEWERS
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

COMMON EIDER DUCK
Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

COMMON SEAL
Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

COMMUNITY DEVELOPMENT
Legal Constraints on Urban Water Systems,
W77-03692 3D

COMPARATIVE BENEFITS
Public Choice and Urban Water Quality,
W77-03960 6B

COMPARATIVE COSTS
Public Choice and Urban Water Quality,
W77-03960 6B

COMPREHENSIVE PLANNING
Coastal Zone Management in Florida,
W77-03699 6E

COMPUTER MODELS
Computer Modeling,
W77-03679 5B

Water Resources Data System,
W77-03728 7C

The Application of HYMO to Study Areas of Southwestern Wyoming for Surface Runoff and Soil Loss Estimates,
W77-03729 4A

Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

A Water Resources Data Management System for South Carolina,
W77-03733 7C

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

Preliminary Digital Model of Ground-Water Flow in the Madison Group, Poweder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

COMPUTER PROGRAMS
Water Resources Data System,
W77-03728 7C

A Water Resources Data Management System for South Carolina,
W77-03733 7C

Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

CONDEMNATION
Canal Authority V Ocala Manufacturing Ice and Packing Company (Construction of Cross Florida Barge Canal).
W77-03715 6E

Condemnation of Land and Water Rights.
W77-03726 6E

CONDEMNATION VALUE
Barnes V United States (Compensation for Flowage Easement Taken Over Plaintiffs' Lands).
W77-03709 6E

CONDENSATION
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

CONFERENCES
Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems.
W77-03642 5B

Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

CONFINED AQUIFERS
Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

CONGESTION
Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

CONGRESSIONAL HEARINGS
The Costs and Effects of Chronic Exposure to Low-Level Pollutants in the Environment,
W77-03701 6G

CONNECTICUT
An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 1st Quarterly Report.
W77-03917 5C

CONNECTICUT

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

CONNECTICUT RIVER
Assessment of Flood Management Alternatives Against Social Performance Criteria, Phase II Report,
W77-03774 6F

CONNECTICUT RIVER BASIN
Assessment of Flood Management Alternatives Against Social Performance Criteria, Phase II Report,
W77-03774 6F

CONSOLIDATION
Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

CONSTRUCTION MATERIALS
Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

CONSUMPTIVE USE
Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

CONTINENTAL SHELF
The International Law of Scientific Research in the Oceans,
W77-03687 6E

CONTINENTAL SLOPE
A Study in the Slope Water Region South of Halifax,
W77-03844 2L

CONTRACTS
Clear Lake Apartments, Inc V Clear Lake Utilities (Exclusive Right to Provide Water Not a Covenant Running With the Land).
W77-03716 6E

CONTROL
Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

CONTROL SYSTEMS
A Scheme for Effective Control of Effluent pH,
W77-03802 5D

COOLING WATER
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

River and Cooling Water Temperature Fluctuations,
W77-03834 5B

A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

COORDINATION
Legal Aspects of Coastal Zone Management in Escambia and Santa Rosa Counties, Florida ('Escarosa'),
W77-03697 6E

COPEPODS
Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

COPPER
Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

COPPER COMPOUNDS
Acclimation and Tolerance of Artemia Salina to Copper Salts,
W77-04044 5C

COPROSTANOL
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

CORAL REEF WATERWAY (FLA)
Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

CORE LOGGING
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

CORN (FIELD)
Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

Reaction Products of Polyphosphates and Orthophosphates with Soils and Influence on Uptake of Phosphorus by Plants,
W77-03636 3F

CORNWALL COAST (U.K.)
An Assessment of the Pollution of Cornish Coastal Waters,
W77-04061 5B

CORPS OF ENGINEERS
Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

CORPUS CHRISTI BAY (TEX)
Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

CORROSION CONTROL
Internal Treatments for Boilers Operating Above 1200 PSI,
W77-03803 8G

CORROSION CONTROL *SCALING
Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

CORRUGATED PIPE
Flow in Corrugated Pipes,
W77-03744 8B

COST MINIMIZATION
Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Least Cost Control Strategies in Urban Drainage Design -- A Dynamic Programming Approach,
W77-04007 4A

COSTS
A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

The Symmetry of Effluent Charges and Subsidies for Pollution Control,
W77-03962 5G

CRABS
Relationships of Epibiotic Fouling and Mortalities of Eggs of the Dungeness Crab (Cancer Magister),
W77-04040 5C

CRASSULACEAN ACID METABOLISM
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

CROP PRODUCTION
Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

The Effects of Streamflow Variation on Production and Income of Irrigated Farms Operating Under the Doctrine of Prior Appropriation,
W77-03637 3F

CROP RESPONSE
Isolation and Characterization of Drought Tolerance in a Grain Sorghum (Sorghum Bicolor (L) Moench) Randommating Population,
W77-03623 2I

Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

CRUDE OIL
Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

Some Effects of Petroleum on Estuarine and Marine Micro-Organisms,
W77-04063 5C

CRUSTACEANS
Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

CURRENTS (WATER)
Evidence of a Westward-Flowing 'Subarctic Countercurrent' in the North Pacific Ocean,
W77-03760 2L

Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

Tidal Currents and Estuarine-Type Circulation in Johnstone Strait, British Columbia,
W77-03846 2L

Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

CYANOPHYTA
Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

On the Fauna of a Freshwater Flat in the Elbe Estuary (Germany), (In German),
W77-04087 5C

CYCLING NUTRIENTS
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

D'IBERVILLE FIORD (CANADA)
A Canadian Arctic Fjord with Some Comparisons to Fjords of the Western Americas,
W77-03977 2L

DAM CONSTRUCTION
Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

DAM EFFECTS
Barnes V United States (Compensation for Flowage Easement Taken Over Plaintiffs' Lands).
W77-03709 6E

DAM FAILURE
Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

DAMAGES
Damages Compensable Under Federal Maritime Law for Injuries Caused by Discharge of Oil into Navigable Waters,
W77-03711 5G

DAMS
Barnes V United States (Compensation for Flowage Easement Taken Over Plaintiffs' Lands).
W77-03709 6E

Multipurpose Development on the Tisza River.
W77-03957 4A

DAPHNIA-LONGIREMIS
Study of the Production Process of Daphnia Longiremis Sars Population from Lake Dalnee by Means of a Mathematical Model, (In Russian),
W77-04055 5C

DARCYS LAW
Introduction to Ground-Water Hydraulics--A Programed Text for Self-Instruction,
W77-03884 8B

DATA COLLECTIONS
Water Resources Data System,
W77-03728 7C

A Compendium of Lake and Reservoir Data Collected by the National Eutrophication Survey in the Northeast and Northcentral United States.
W77-03784 5C

Demonstration of a State Water Quality Management Information System,
W77-04021 5G

DATA STORAGE AND RETRIEVAL
Water Resources Data System,
W77-03728 7C

A Water Resources Data Management System for South Carolina,
W77-03733 7C

DATA SYSTEMS
Water Resources Data System,
W77-03728 7C

DATING
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

DDT
Adsorption of C14-DDT to Particle Surfaces,
W77-03658 5B

Water-Sediment Distribution of Chlorinated Hydrocarbon Pesticides in Various Environmental Conditions,
W77-03660 5B

Time and Space Dependence of Pollutant Levels in Aquatic Biota, Field Studies,
W77-03676 5B

Trends of PCB and DDT in Fish and Aquatic Birds,
W77-03677 5B

DECISION MAKING
Institutions and Objectives on the Water, Energy, Environment Interface,
W77-03934 6B

Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

Application of Game Theory in Water Management,
W77-04009 6A

Preference Models of Environmental Impact,
W77-04020 6G

DECOMPOSING ORGANIC MATTER
The Decomposition of Leaves in Two Southern California Streams,
W77-03829 5B

DECOMPOSITION RATES (LEAVES)
The Decomposition of Leaves in Two Southern California Streams,
W77-03829 5B

DEGRADATION (DECOMPOSITION)
Effect of Various Factors on Glucose Decomposition Rate in Natural Waters, (In Russian),
W77-03862 5C

DEHYDRATION
Continuous Bowl-Type Centrifuges for the Clarification and Dehydration of Sludges from the Paper Industry (Centrifugeuses Continues A Bol Plein Pour Clarification et Deshydration des Boues Dans L'Industrie Papetiere).
W77-03613 5D

DELAWARE
Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

DELTAS
Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

DEMAND
Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

DENSITY
Hydraulics of Surface Buoyant Jet,
W77-03743 8B

Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

A Study in the Slope Water Region South of Halifax,
W77-03844 2L

Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

DESALINATION
Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

DESALINATION PLANTS
The Integration of Desalination Plant with Existing Australian Water Resources,
W77-04018 3A

DESERT PLANTS
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

DESERTIFICATION
Desertification: Symptom of a Crisis,
W77-03737 4C

DESERTIFICATION

The Consequences of Fooling Mother Nature,
W77-03738 2B

Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

Desertification and the Salinity Problem in Australia,
W77-03741 4C

DESERTS

Desertification: Symptom of a Crisis,
W77-03737 4C

Desertification and the Salinity Problem in Australia,
W77-03741 4C

DESTRATIFICATION

The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

DETERGENTS

Study on the Long-Term Effects of Some Detergents on the Sequence of Development of the Sedentary Polychaete, Capitella Capitata (Fabricius), (In French),
W77-04067 5C

DETROIT RIVER (MICH)

Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

DEUTERIUM

Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

DEW

Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

DIATOMS

Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

DIELDRIN

Water-Sediment Distribution of Chlorinated Hydrocarbon Pesticides in Various Environmental Conditions,
W77-03660 5B

DIETHYLNITROSOME

Toxicological Effects of Diethylnitrosamine (DENA) in Guppies (Lebistes Reticulatus), (In German),
W77-04100 5C

DIFFUSION

Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

DISINFECTION

Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

DISPERSION

Transverse Dispersion in Meandering Channels,
W77-03644 2E

Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

DISSOLVED OXYGEN

Effect of Various Factors on Glucose Decomposition Rate in Natural Waters, (In Russian),
W77-03862 5C

DISSOLVED SOLIDS

Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

DISTILLATION

Purification of Wine Distillery Effluents (Epuration Des Effluents De Distilleries Vinicoles),
W77-03606 5D

DISTRIBUTION

Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

Distribution and Abundance of Heavy Metals in Finfish, Invertebrates and Sediments Collected at a Deep Water Disposal Site,
W77-04046 5B

Molecular Test for Oil Pollution in Surface Sediments,
W77-04058 5B

DISTRIBUTION PATTERNS

An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

DIURON

Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

DIVERSION

State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

DONETS RIVER BASIN CANAL (USSR)

Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

DRAINAGE

Unsaturated Zone and Vertical-Flow Components in Draining Unconfined Formations,
W77-04000 2F

DRAINAGE SYSTEMS

Kravec V State (Interior Land Owners' Right to Bridge State's Drainage Ditch Easement).
W77-03718 6E

Levees, Drains and Ditches,
W77-03727 6E

DRAINAGE WATER

Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

Kravec V State (Interior Land Owners' Right to Bridge State's Drainage Ditch Easement).
W77-03718 6E

DRAWDOWN

Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

DREDGING

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 1st Quarterly Report.
W77-03917 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

DRIP IRRIGATION

Irrigation Pipes with Dripper Units and Method of its Manufacture,
W77-03871 3F

DROUGHT RESISTANCE

Isolation and Characterization of Drought Tolerance in a Grain Sorghum (Sorghum Bicolor (L) Moench) Randommating Population,
W77-03623 2I

DROUGHT TOLERANCE

Isolation and Characterization of Drought Tolerance in a Grain Sorghum (Sorghum Bicolor (L) Moench) Randommating Population,
W77-03623 2I

DROUGHTS

Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

DUNGENESS CRAB (CANCER MAGISTER)

Relationships of Epibiotic Fouling and Mortalities of Eggs of the Dungeness Crab (Cancer Magister),
W77-04040 5C

DUSTS

Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

DYES

In-Plant, Outside Pollution Evils, Energy Saving Top AATCC Concerns.
W77-03620 5G

Effect of Dyes Used in the Textile Industry on the Purification of Effluents by the Activated Sludge Process (Wplyw niektorych barwnikow

stosowanych w przemysle wlokienniczym na oczyszczanie sziekow osadem czynnym),
W77-03821 5D

DYNAMIC PROGRAMMING
Ground Water Management and Surface Water Development for Irrigation,
W77-03929 4B

Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

Multilevel Incremental Dynamic Programing,
W77-03937 6A

Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

Least Cost Control Strategies in Urban Drainage Design -- A Dynamic Programming Approach,
W77-04007 4A

E. COLI
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

EARTHQUAKES
Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters,
W77-03990 2K

EASEMENTS
Kravec V State (Interior Land Owners' Right to Bridge State's Drainage Ditch Easement).
W77-03718 6E

ECOLOGY
Physical Exchange in Stream Ecology Studies,
W77-03648 2J

ECONOMIC ASPECTS
Institutions and Objectives on the Water, Energy, Environment Interface,
W77-03934 6B

ECONOMIC EFFICIENCY
National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

ECONOMIC IMPACT
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

ECONOMIC OPTIMUM
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

ECONOMIC SUB-REGIONS
Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

ECONOMICS
Economic Modeling for Water Policy Evaluation.
W77-03924 6A

Water Resource Models: A Historical Summary,
W77-03925 6A

Water Quality Management and the Distribution of Emission Rights by Sealed Tender Markets,
W77-03931 5G

Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

ECOSYSTEMS
Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems.
W77-03642 5B

Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

Coastal Marine Pollution and Fish,
W77-03902 5C

Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

EELS
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

EFFECTS
Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

EFFLUENT CHARGES
A Note on Effluent Charges and Market Structure,
W77-03955 5G

Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

The Symmetry of Effluent Charges and Subsidies for Pollution Control,
W77-03962 5G

EFFLUENTS
The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

Purification of Wine Distillery Effluents (Epuration Des Effluents De Distilleries Vinicoles),
W77-03606 5D

Purifying and Regenerating Gaseous and Fluid Phase Effluents -- Such as Ammonia Mixtures from Wool Processing, Mercerising Etc.
W77-03617 5D

A Scheme for Effective Control of Effluent pH,
W77-03802 5D

Use of Effluents from Fermentation Plants for Field Irrigation (Ispol'zovanie stochnykh vod gidroliznykh zavodov dlya orosheniya polei),
W77-03814 5D

ELASTICITY OF DEMAND
Estimating Net Benefits of Recreation Under Conditions of Excess Demand,
W77-03964 6D

ELBE ESTUARY (W. GERMANY)
On the Fauna of a Freshwater Flat in the Elbe Estuary (Germany), (In German),
W77-04087 5C

ELECTROCHEMISTRY
Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

Electrochemical Purification of Effluents from the Manufacture of Sulfite and Kraft Pulps (Elektrokhimicheskaya ochistka stochnykh vod ot proizvodstva sul'fitnoi i sul'fatnoi tsellyulozy),
W77-03815 5D

ELECTROHYDRAULICS
Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

ELECTRON-CAPTURE GAS CHROMATOGRAPHY
Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

ELECTROPHORESIS
Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

ELECTROPLATING INDUSTRY
Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

ELLESMERE ISLAND (CANADA)
Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

EMINENT DOMAIN
State Administration Generally (Powers and Duties of the Department of Water Resources).
W77-03704 6E

EMINENT DOMAIN

Taylor V Board of Levee Commissioners of the Tensas Basin Levee District (A Taking for Levee Purposes).
W77-03707 6E

Canal Authority V Ocala Manufacturing Ice and Packing Company (Construction of Cross Florida Barge Canal).
W77-03715 6E

ENERGY
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

ENERGY FLUXES
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

ENGLISH CHANNEL
The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

ENTRAINMENT
Hydraulics of Surface Buoyant Jet,
W77-03743 8B

ENVIRONMENTAL CONTROL
Environmental Protection in Mexico and Canada,
W77-03698 6E

Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

Preference Models of Environmental Impact,
W77-04020 6G

ENVIRONMENTAL CONTROL
***ENVIRONMENTAL ENGINEERING**
A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

ENVIRONMENTAL EFFECTS
Thermal Effects on Aquatic Organisms, Annotated Bibliography of the 1975 Literature.
W77-03640 5C

The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

Partitioning and Uptake of Pesticides in Biological Systems,
W77-03659 5C

Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

Coastal Marine Pollution and Fish,
W77-03902 5C

Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

An Oil Slick Sampling System,
W77-03909 5A

Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 1st Quarterly Report.
W77-03917 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

ENVIRONMENTAL ENGINEERING
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

ENVIRONMENTAL IMPACT
Preference Models of Environmental Impact,
W77-04020 6G

ENVIRONMENTAL SANITATION
Marine Sanitation.
W77-03720 6E

EQUATIONS
Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

Introduction to Ground-Water Hydraulics--A Programed Text for Self-Instruction,
W77-03884 8B

An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

EROSION
Segments of a Vicious Circle: Land Degradation and Water Resources,
W77-03740 4C

The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

EROSION CONTROL
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

EROSION PREDICTIONS
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

EROSION RATES
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

ERTS-1
ERTS-1, A New Window on Our Planet,
W77-03875 7B

ESCAMBIA BAY (FLA)
Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

ESTIMATED BENEFITS
Estimating Net Benefits of Recreation Under Conditions of Excess Demand,
W77-03964 6D

ESTUARIES
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

Mass and Salt Transfers and Halocline Depths in an Estuary,
W77-03751 2L

Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

Tidal Currents and Estuarine-Type Circulation in Johnstone Strait, British Columbia,
W77-03846 2L

Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

On the Description of the Hydrographic State and the Circulation in the Baltic Deep Water,
W77-04006 2L

ESTUARINE CIRCULATION

Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

ESTUARINE ENVIRONMENT

Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

ESTUARINE FISHERIES

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

ESTUARINE MICROORGANISMS

Some Effects of Petroleum on Estuarine and Marine Micro-Organisms,
W77-04063 5C

ETHANOL

An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

EUGLENOPHYTA

Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

EUPHAUSIIDS

Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

EUPHRATES RIVER (IRAQ)

Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

EUTROPHICATION

A Compendium of Lake and Reservoir Data Collected by the National Eutrophication Survey in the Northeast and Northcentral United States.
W77-03784 5C

Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

EVALUATION

Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

EVAPORATION

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

Space-Time Correlation Function of the Field of Evaporation from the Water Surface,
W77-03849 2D

Evaporation and Advection I: Evaporation from Extensive Homogeneous Surfaces,
W77-03859 2D

EVAPORATIVE COOLING

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

EVAPOTRANSPIRATION

Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

EVERGREEN LAKE (ILL)

The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

EXPENDITURES

A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

FECAL COLIFORM

The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

FECAL STEROLS

The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

FECUNDITY

Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

FEDERAL GOVERNMENT

Contingency Plan for Spills of Oil and Hazardous Materials for Inland Waters of Region III.
W77-03700 5G

The Costs and Effects of Chronic Exposure to Low-Level Pollutants in the Environment,
W77-03701 6G

FEDERAL RECLAMATION LAW

Validity, Construction, and Application of S 5 of Reclamation Law of 1902 (43 USCS S 431),
W77-03712 6E

FEDERAL WATER POLLUTION CONTROL ACT

Section 208 Program Review, (Environmental Protection Agency), (Draft).
W77-03686 5D

Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

FEEDS

Treatment of Putrefactive Meat and Fish Waste -- for Preparation of Manure, Animal Feeds and Fuel Oil,
W77-03608 5D

FENAC

Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

FERMENTATION

Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici),
W77-03603 5D

Method and Apparatus for Anaerobic Fermentation,
W77-03873 5D

FERMENTATION INDUSTRY

Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

FERMENTATION PLANT

Preparation of Fertilizers from Effluent Sludges of Fermentation Plants (Poluchenie udobrenii iz shlamovykh otkhodov gidroliznogo proizvodstva),
W77-03810 5E

FERTILIZATION

Deleterious Effects of Corexit 9527 on Fertilization and Development,
W77-04050 5C

FERTILIZERS

Treatment of Putrefactive Meat and Fish Waste -- for Preparation of Manure, Animal Feeds and Fuel Oil,
W77-03608 5D

Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

FERTILIZERS

Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

Preparation of Fertilizers from Effluent Sludges of Fermentation Plants (Poluchenie udobrenii iz shlamovykh otkhodov gidroliznogo proizvodstva),
W77-03810 5E

FILL PERMITS

State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

FILTERS

Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

FIN EROSION DISEASE

Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

FINITE DIFFERENCES

Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

FINITE ELEMENT ANALYSIS

Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

FINLAND

Possible uses for Fibrous Sludges from the Pulp and Paper Industry,
W77-03817 5E

Meromictic Mechanisms in a Coastal Lake, (In Finnish),
W77-04071 5C

FIRM MODEL

Water Quality Management and the Distribution of Emission Rights by Sealed Tender Markets,
W77-03931 5G

FISH BEHAVIOR

Mercury Effects on Swimming and Metabolism of Trout,
W77-03678 5C

FISH DISEASES

Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

FISH FOOD ORGANISMS

Change of Biocenoses in Artificial Bodies of Water Due to Human Intervention, (In Russian),
W77-03618 5C

FISH HARVEST

Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

FISH PHYSIOLOGY

Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

FISH POPULATIONS

A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

FISHERIES

Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

FJORDS

Control of Fjordic Deep Water Renewal by Runoff Modification,
W77-03975 2L

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

A Canadian Arctic Fjord with Some Comparisons to Fjords of the Western Americas,
W77-03977 2L

FLAMING GORGE RESERVOIR (UTHA-WYO)

Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

FLOCCULATION

Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

Operating Experiences with an Electrolytic Method for Purifying NSSC (Neutral Sulfite Semichemical) Effluent (Betriebserfahrungen mit einem elektrolytischen Verfahren bei der Reinigung von NSSC-Abwasser),
W77-03820 5D

FLOOD CONTROL

Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

FLOOD DAMAGE

Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

FLOOD FORECASTING

Magnitude and Frequency of Floods in Nebraska,
W77-03886 2E

FLOOD FREQUENCY

Magnitude and Frequency of Floods in Nebraska,
W77-03886 2E

Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

Multivariable Flood Level Frequency Distributions,
W77-03996 8B

FLOOD PEAK

Magnitude and Frequency of Floods in Nebraska,
W77-03886 2E

FLOOD PLAIN INSURANCE

Analysis of the National Flood Insurance Act,
W77-03693 6E

The National Flood Insurance Program: Explanation and Legal Implications,
W77-03956 6F

FLOOD PLAIN ZONING

Analysis of the National Flood Insurance Act,
W77-03693 6E

The National Flood Insurance Program: Explanation and Legal Implications,
W77-03956 6F

FLOOD PLAINS

Some Problems in the Study of the Inundation of River Flood Plains by Aerospace Methods,
W77-03847 4A

FLOOD PROTECTION

Analysis of the National Flood Insurance Act,
W77-03693 6E

Assessment of Flood Management Alternatives Against Social Performance Criteria, Phase II Report,
W77-03774 6F

FLOODING

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

FLOODPROOFING

Analysis of the National Flood Insurance Act,
W77-03693 6E

FLOODS

Some Problems in the Study of the Inundation of River Flood Plains by Aerospace Methods,
W77-03847 4A

Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

FLORIDA

Artificial and Natural Lakes,
W77-03694 6E

Ownership of Submerged Lands in Florida,
W77-03695 6E

Legal Protection for Florida Wetlands,
W77-03696 6E

Legal Aspects of Coastal Zone Management in Escambia and Santa Rosa Counties, Florida ('Escarosa'),
W77-03697 6E

Coastal Zone Management in Florida,
W77-03699 6E

The Deltona Corporation V Board of Trustees of the Internal Improvemenr Trust Fund.
W77-03708 6E

Canal Authority V Ocala Manufacturing Ice and Packing Company (Construction of Cross Florida Barge Canal).
W77-03715 6E

Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

Efforts in Marine Revegetation in Artificial Habitats,
W77-03949 5G

Aspects of Red Mangrove Reforestation in Florida,
W77-03950 5G

Suggested Mangrove Transplanting Techniques,
W77-03951 5G

Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

FLOW
Physical Exchange in Stream Ecology Studies,
W77-03648 2J

Flow in Corrugated Pipes,
W77-03744 8B

Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

FLOW CHARACTERISTICS
Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

FLOW EQUALIZATION
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

FLOW PROFILES
Flow at Grade-Break from Mild to Steep Slopes,
W77-03746 8B

FLOW REGULATOR
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

FLUCTUATIONS
Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

FOLIAGE REMOVAL
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

FOOD CHAINS
Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

FOOD PROCESSING INDUSTRY
Purification of Wine Distillery Effluents (Epuration Des Effluents De Distilleries Vinicoles),
W77-03606 5D

FOOD PRODUCTION
Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

FORECASTING
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

FOREIGN COUNTRIES
Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

FOREIGN PROJECTS
Multipurpose Development on the Tisza River.
W77-03957 4A

FOREIGN TRADE
Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

FOREST MANAGEMENT
Effects of Forest Cultural Treatments Upon Streamflow,
W77-03795 4C

A Comparison of Modeling and Statistical Evaluation of Hydrologic Change,
W77-03800 4D

An Investigation into the Effects of Forestry Plantations on the Water Quality of Upland Reservoirs in Northern Ireland,
W77-03840 5B

Alteration of Water Regulating and Protective Features of the Forest Under Influence of Forestry Measures, (In Russian),
W77-04002 4C

FORMULA DERIVATION
On a Derivable Formula for Long-Wave Radiation from Clear Skies,
W77-03638 2B

FRANCE
Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

FRANCE (CLERMONT-FERRAND)
Intensity of Rainfall in Clermone-Ferrand, (In French),
W77-04032 2B

FRASER RIVER (BC)
Trace Metal Pollution from a Metropolitan Area: Sources and Accumulation in the Lower Fraser River and Estuary,
W77-03652 5B

FREQUENCY
Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

FREQUENCY ANALYSIS
Multivariable Flood Level Frequency Distributions,
W77-03996 8B

FREQUENCY WAVES
Multivariable Flood Level Frequency Distributions,
W77-03996 8B

FRESHWATER
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

FUELS
National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

FULVIC ACIDS
Dynamics of Interaction of Cations and Fulvic Acid,
W77-03662 2K

Dynamics of Microbially Produced Fulvic Material in Aquatic Environments Relative to Different Conditions of Temperature and pH,
W77-03664 5C

GAME THEORY
Application of Game Theory in Water Management,
W77-04009 6A

GAS CHROMATOGRAPHY
Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

Identification of Gasoline Contamination of Groundwater by Gas Chromatography,
W77-03796 5A

Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

GASES
Purifying and Regenerating Gaseous and Fluid Phase Effluents -- Such as Ammonia Mixtures from Wool Processing, Mercerising Etc.
W77-03617 5D

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

GASOLINE
Identification of Gasoline Contamination of Groundwater by Gas Chromatography,
W77-03796 5A

GEOCHEMISTRY
Geochemical Interaction in the Recently Industrialized Strait of Canso,
W77-03649 5B

Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

GEOLOGY
Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

GEOMORPHOLOGY
Largescale Ripples of the Lower Wabash River,
W77-03761 2J

GEORGIA
Runoff Files for Flood Hydrograph Simulation,
W77-03748 2E

GEOTHERMAL STUDIES
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

GERMANY
Effect of Residues from Effluent Treatment During Solid Board Manufacture (Auswirkung von Rueckstanden aus der Abwasserreinigung bei der Vollpappenerzeugung),
W77-03819 5D

Weed Control and the Environment, (In French),
W77-04041 5B

GILL STRUCTURE
The Effect of Ammonia Exposure on Gill Structure of the Rainbow Trout (Salmo Gairdneri),
W77-04056 5C

GILLS
Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

GIUSEPPE VENTUROLI
Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

GLACIAL SEDIMENTS
Glacial Lake Sedimentation, Austerdalsisen, Norway,
W77-04005 2J

GLACIERS
Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

GLACIOLOGY
Glacial Lake Sedimentation, Austerdalsisen, Norway,
W77-04005 2J

GLUCOSE
Concentration of Organic Substances in Water as a Factor Controlling the Occurrence of Some Ciliate Species,
W77-03839 5C

Effect of Various Factors on Glucose Decomposition Rate in Natural Waters, (In Russian),
W77-03862 5C

GLYCOGEN
Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

GOOSE LAKE INTERSTATE COMPACT
Oregon- California Goose Lake Interstate Compact.
W77-03706 6E

GRAIN SORGHUM
Isolation and Characterization of Drought Tolerance in a Grain Sorghum (Sorghum Bicolor (L) Moench) Randommating Population,
W77-03623 2I

GRAND STAND (SC)
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

GRASSES
Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

GRAZING
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

GREAT LAKES
The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

GREEN FISH
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

GREEN LAKE (ONT)
Hydrocarbons in a Wilderness Lake,
W77-04048 5B

GREENLAND
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

GROUNDWATER
Identification of Gasoline Contamination of Groundwater by Gas Chromatography,
W77-03796 5A

Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

Water Resources Data for Nebraska, Water Year 1975,
W77-03885 7C

Water Availability of Jefferson County, Alabama,
W77-03894 4A

Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

Ground Water Management and Surface Water Development for Irrigation,
W77-03929 4B

Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters,
W77-03990 2K

GROUNDWATER HYDRAULICS
Introduction to Ground-Water Hydraulics--A Programed Text for Self-Instruction,
W77-03884 8B

GROUNDWATER MOVEMENT
Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

Preliminary Digital Model of Ground-Water Flow in the Madison Group, Powder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

Introduction to Ground-Water Hydraulics--A Programed Text for Self-Instruction,
W77-03884 8B

GROUNDWATER RECHARGE
Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

GROUNDWATER RESOURCES
Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

Water Availability, Quality, and use in Alaska.
W77-03883 6B

Introduction to Ground-Water Hydraulics--A Programed Text for Self-Instruction,
W77-03884 8B

Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

Ground-Water Resources and Geology of Jefferson County, Wisconsin,
W77-03889 4B

Water Resources of El Paso County, Colorado,
W77-03890 6D

GROWTH RATES
Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

GROWTH RATES FISH
Change of Biocenoses in Artificial Bodies of Water Due to Human Intervention, (In Russian),
W77-03618 5C

GULF OF MEXICO
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

GULF OF ST LAWRENCE
Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

GULF STREAM
Measurements of a Small Near-Bottom Cyclonic Circulation Near the Gulf Stream Axis,
W77-03842 2L

A Study in the Slope Water Region South of Halifax,
W77-03844 2L

HALOCARBONS (HALOGENATED HYDROCARBONS)
Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

HALOCLINE
Mass and Salt Transfers and Halocline Depths in an Estuary,
W77-03751 2L

HALOGENATED ALIPHATIC HYDROCARBONS
The Distribution of Short-Chain Halogenated Aliphatic Hydrocarbons in Some Marine Organisms,
W77-04051 5C

HARD CLAMS
Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

HARDNESS (WATER)
Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

HAWAII
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

HAZARD FUNCTION
Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

HAZARDS
Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

HEAT BUDGET
Experiments with the Surface Heat and Water Budgets of the Canadian Middle North,
W77-03749 2D

HEAT EXCHANGERS
Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

HEAT TRANSFER
Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

HEATED WATER
Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

HEAVY METALS
Solidifying Sludge Containing Heavy Metals -- by Treating with Sulphur Compounds, Colloidal Sulphur and Bituminous Emulsion.
W77-03611 5D

Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

Heavy Metal Pollutants in the Sediments of the Rhone River,
W77-03651 5B

Heavy Metals in the Lower Mississippi,
W77-03654 5B

Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

Distribution and Abundance of Heavy Metals in Finfish, Invertebrates and Sediments Collected at a Deep Water Disposal Site,
W77-04046 5B

Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

Mercury in Tissues of Mussel Off Southern California,
W77-04060 5C

HEPTACHLOR
Water-Sediment Distribution of Chlorinated Hydrocarbon Pesticides in Various Environmental Conditions,
W77-03660 5B

HERBICIDES
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

Weed Control and the Environment, (In French),
W77-04041 5B

Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian),
W77-04097 5C

HERRINGS
Trends of PCB and DDT in Fish and Aquatic Birds,
W77-03677 5B

HETEROTROPHIC MICROORGANISMS
The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

HISTORY
An Historical Sketch of Physical Oceanography in Canada,
W77-03759 2L

Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

Water Resource Models: A Historical Summary,
W77-03925 6A

HOLLOMAN AIR FORCE BASE (N MEX)
Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

HOMOGENEITY
Evaporation and Advection I: Evaporation from Extensive Homogeneous Surfaces,
W77-03859 2D

HOSES
Hose or Pipe for Sprinkling or Irrigation,
W77-03864 3F

HOWE SOUND (BRITISH COLUMBIA)
Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

HUDSON BAY (CANADA)
Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

HUMIC ACIDS
Dynamics of Microbially Produced Fulvic Material in Aquatic Environments Relative to Different Conditions of Temperature and pH,
W77-03664 5C

HUMIDITY
Lake Erie Terrestrial Radiation,
W77-03858 2H

HYBRID COMPUTERS
Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

HYDRAULIC JUMP
Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

HYDRAULIC MODELS
Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

HYDRAULICS
Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

Stability of Channel Beds by Amoring,
W77-03836 8B

HYDRO-POWER
Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

HYDROCARBON MEASUREMENT
Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

HYDROCARBON TRACES
Hydrocarbons in a Wilderness Lake,
W77-04048 5B

HYDROCARBONS (NON-VOLATILE)
Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

HYDRODYNAMICS
The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

HYDROELECTRIC PLANTS
Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

HYDROGEN ION CONCENTRATION
Dynamics of Microbially Produced Fulvic Material in Aquatic Environments Relative to Different Conditions of Temperature and pH,
W77-03664 5C

A Scheme for Effective Control of Effluent pH,
W77-03802 5D

Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters,
W77-03990 2K

HYDROGRAPH ANALYSIS
Runoff Files for Flood Hydrograph Simulation,
W77-03748 2E

HYDROGRAPHY
Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

HYDROLOGIC ASPECTS
Hydrologic Aspects of Space Investigations of the Earth's Surface (Literature Survey),
W77-03848 7B

HYDROLOGIC BOUNDARIES
Hydrologic Unit Map--1974, State of Colorado.
W77-03893 7C

HYDROLOGIC BUDGET
Experiments with the Surface Heat and Water Budgets of the Canadian Middle North,
W77-03749 2D

HYDROLOGIC DATA
Water Resources Data for Nebraska, Water Year 1975,
W77-03885 7C

Water Availability of Jefferson County, Alabama,
W77-03894 4A

The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

HYDROLOGIC UNIT MAPS (COLOR)
Hydrologic Unit Map--1974, State of Colorado.
W77-03893 7C

HYDROLOGY
Hydrologic Unit Map--1974, State of Colorado.
W77-03893 7C

HYDROLYSIS
Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

HYDROTHERMAL PREDICTION
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

HYDROTHERMAL STUDIES
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

HYPERSALINE ENVIRONMENTS
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

HYPOLIMNION
Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

HYPOTHESIS
Rollers and Ripples in Sand, Streams and Sky: Rhythmic Alteration of Transverse and Longitudinal Vortices in Three Orders,
W77-03998 2J

ICE
Theoretical Model of River Ice Jams,
W77-03745 2C

Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

ICE COVER
Estimate of the Suitability of Television Information from Meteorological Meteor Satellites for Determining Ice Conditions in Lakes and Reservoirs,
W77-03765 2C

ICE JAMS
Theoretical Model of River Ice Jams,
W77-03745 2C

IDAHO
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

ILLINOIS
Lead Transport in a River Ecosystem,
W77-03672 5B

Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

Largescale Ripples of the Lower Wabash River,
W77-03761 2J

The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

IMPERIAL VALLEY
Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

IMPERIAL VALLEY (CALIF)
A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

IMPOUNDMENTS
A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

INDIA
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

INDIAN RIVER (FLA)
Aspects of Red Mangrove Reforestation in Florida,
W77-03950 5G

INDIANA
Largescale Ripples of the Lower Wabash River,
W77-03761 2J

INDUSTRIAL MODELS
National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

INDUSTRIAL PLANTS
Chemical-Industry Costs of Water Pollution Abatement,
W77-03604 5D

INDUSTRIAL PRODUCTION
Chemical-Industry Costs of Water Pollution Abatement,
W77-03604 5D

INDUSTRIAL WASTES
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

Chemical-Industry Costs of Water Pollution Abatement,
W77-03604 5D

Purification of Wine Distillery Effluents (Epuration Des Effluents De Distilleries Vinicoles),
W77-03606 5D

Treatment of Putrefactive Meat and Fish Waste -- for Preparation of Manure, Animal Feeds and Fuel Oil,
W77-03608 5D

On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

Continuous Bowl-Type Centrifuges for the Clarification and Dehydration of Sludges from the Paper Industry (Centrifugeuses Continues A Bol Plein Pour Clarification et Deshydration des Boues Dans L'Industrie Papetiere).
W77-03613 5D

Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

Solvent and Solvency -- A Solution to Sludge Problems,
W77-03616 5D

Purifying and Regenerating Gaseous and Fluid Phase Effluents -- Such as Ammonia Mixtures from Wool Processing, Mercerising Etc.
W77-03617 5D

Evaluation of Wastewater Treatment Facilities.
W77-03619 5D

In-Plant, Outside Pollution Evils, Energy Saving Top AATCC Concerns.
W77-03620 5G

Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

Modeling Process Substitutions by LP and MIP,
W77-03933 5G

Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

INDUSTRIAL WATER
National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

INFILTRATION
Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

INFILTRATION RATES
Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

INFORMATION RETRIEVAL
A Water Resources Data Management System for South Carolina,
W77-03733 7C

INFORMATION SYSTEM
Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

INFORMATION SYSTEMS
Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

Demonstration of a State Water Quality Management Information System,
W77-04021 5G

INFRARED RADIATION
ERTS-1, A New Window on Our Planet,
W77-03875 7B

INFRARED SPECTROPHOTOMETRY
Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

INJUNCTIONS (MANDATORY)
State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

INJUNCTIVE RELIEF
Kattor V Sabatini (No Right of Diverting Surface Water by Artificial Channel).
W77-03714 6E

State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

Marine Sanitation.
W77-03720 6E

INSECTS
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

INSTITUTIONS
Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

INTEGER LINEAR PROGRAMMING
Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

INTEGRAL TRANSFORMS
Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

INTER-AGENCY COOPERATION
Contingency Plan for Spills of Oil and Hazardous Materials for Inland Waters of Region III.
W77-03700 5G

INTERNAL WAVES
Spectra and Coherence of Wind-Generated Internal Waves,
W77-03982 2L

INTERNATIONAL LAW
The International Law of Scientific Research in the Oceans,
W77-03687 6E

INTERSTATE
Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

INTERSTATE COMPACTS
Klamath River Basin Compact.
W77-03705 6E

Oregon- California Goose Lake Interstate Compact.
W77-03706 6E

Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

INTERTIDAL AREAS
Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

INTERTIDAL AREAS

The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

Efforts in Marine Revegetation in Artificial Habitats,
W77-03949 5G

Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

INTRACOASTAL WATERWAY (SC)
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

INVERTEBRATES
Change of Biocenoses in Artificial Bodies of Water Due to Human Intervention, (In Russian),
W77-03618 5C

ION EXCHANGE
The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

ION TRANSPORT
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

IONS
The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

IRAQ
Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

IRON
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

IRRIGATION
Irrigation Pipes with Dripper Units and Method of its Manufacture,
W77-03871 3F

Ground Water Management and Surface Water Development for Irrigation,
W77-03929 4B

IRRIGATION DITCHES
Levees, Drains and Ditches,
W77-03727 6E

IRRIGATION EFFICIENCY
Hose or Pipe for Sprinkling or Irrigation,
W77-03864 3F

Irrigation Pipes with Dripper Units and Method of its Manufacture,
W77-03871 3F

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

Irrigation Efficiency, A Bibliography, Volume 2.
W77-03968 3F

IRRIGATION PRACTICES
The Effects of Streamflow Variation on Production and Income of Irrigated Farms Operating Under the Doctrine of Prior Appropriation,
W77-03637 3F

IRRIGATION WATER
Use of Effluents from Fermentation Plants for Field Irrigation (Ispol'zovanie stochnykh vod gidroliznykh zavodov dlya orosheniya polei),
W77-03814 5D

ISE BAY (JAPAN)
Water Pollution of the Rivers Flowing Eastwards into the Bay of Ise, (In Japanese),
W77-04080 5B

ISLANDS
Acquisition of Property (Islands).
W77-03723 6E

ISOSTATIC VARIATIONS
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

ITALY
Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian),
W77-04084 5G

JACKSON LAKE (WYO)
Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

JAMES BAY (CANADA)
Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

JAPAN
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

Water Pollution of the Rivers Flowing Eastwards into the Bay of Ise, (In Japanese),
W77-04080 5B

JAPAN (MAKOMO VALLEY)
On the Counterplan for Treatment of Foul Water Which Oozed Out from A Dumping Ground, (In Japanese),
W77-04066 5D

JAPAN (TAGONOURA-PORT)
Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

JEFFERSON COUNTY (ALA)
Water Availability of Jefferson County, Alabama,
W77-03894 4A

JEMEZ MOUNTAINS (NM)
Augmentation of 1968-1972 Winter Storms in New Mexico,
W77-03838 3B

JETS
Hydraulics of Surface Buoyant Jet,
W77-03743 8B

Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

JOHNSTONE STRAIT (CANADA)
Tidal Currents and Estuarine-Type Circulation in Johnstone Strait, British Columbia,
W77-03846 2L

JUAN DE FUCA STRAIT (CANADA)
Numerical Model Studies of the Tides Between Vancouver Island and the Mainland Coast,
W77-03984 2L

JUDICIAL DECISIONS
Barnes V United States (Compensation for Flowage Easement Taken Over Plaintiffs' Lands).
W77-03709 6E

Kempf V Ellixson (Determination of Riparian Rights Where Land is Separated from Body of Water by Public Highway).
W77-03710 6E

JURISDICTION
Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

KANEOHE BAY (HI)
Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

KAOLINITE
Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

KEYHOLE RESERVOIR
Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

KIEV RESERVOIR (USSR)
Primary Production of Green Filamentous Algae from the Kiev Reservoir, (In Russian),
W77-04070 5C

KINETICS
The Kinetics of Accumulation and Excretion of Ferric Hydroxide in Mytilus Edulis (L.) and its Distribution in the Tissues,
W77-04028 5C

KLAMATH RIVER BASIN (ORE)
Klamath River Basin Compact.
W77-03705 6E

KRAFT MILLS
Design of an Efficient Water System for a Kraft Pulp Mill,
W77-03804 5D

Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

KUTCH (INDIA)
A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

KUWAIT CRUDE OIL
Uptake and Retention of Kuwait Crude Oil and its Effects on Oxygen Uptake by the Soft-Shell Clam, Mya Arenaria,
W77-04026 5C

LA HAVE RIVER
Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

LABORATORY EQUIPMENT
Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

LABORATORY TESTS
Interaction Between Aquatic Plants and River Bed Sediments in the Uptake of Mercury from Flowing Water,
W77-03671 5C

Flow in Corrugated Pipes,
W77-03744 8B

The Production and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

LABRADOR CURRENT
A Study in the Slope Water Region South of Halifax,
W77-03844 2L

LACTIC ACID
Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

LAGOONS
A Study on the Influence of Salinity Fluctuations upon the Bacterial Flora of the Lagoon Cienaga Grade de Sante Marta (Colombia) and the Adjacent Coastal Region, (In German),
W77-04076 5B

LAKE CIRCULATION
Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

LAKE CURRENTS
Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

LAKE ERIE
Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

Lake Erie Terrestrial Radiation,
W77-03858 2H

LAKE HAVASU (ARIZ)
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

LAKE MICHIGAN
Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

LAKE SHORES
Kempf V Ellixson (Determination of Riparian Rights Where Land is Separated from Body of Water by Public Highway).
W77-03710 6E

LAKE SUPERIOR
Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

LAKE WINNIPEG (CANADA)
Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

LAKES
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

Artificial and Natural Lakes,
W77-03694 6E

Oregon- California Goose Lake Interstate Compact.
W77-03706 6E

The Deltona Corporation V Board of Trustees of the Internal Improvemenr Trust Fund.
W77-03708 6E

Estimate of the Suitability of Television Information from Meteorological Meteor Satellites for Determining Ice Conditions in Lakes and Reservoirs,
W77-03765 2C

The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

A Compendium of Lake and Reservoir Data Collected by the National Eutrophication Survey in the Northeast and Northcentral United States.
W77-03784 5C

Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

Glacial Lake Sedimentation, Austerdalsisen, Norway,
W77-04005 2J

Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

LAND DEGRADATION
Segments of a Vicious Circle: Land Degradation and Water Resources,
W77-03740 4C

LAND MANAGEMENT
The California Coastal Plan (A Symposium).
W77-03688 6E

Desertification: Symptom of a Crisis,
W77-03737 4C

Segments of a Vicious Circle: Land Degradation and Water Resources,
W77-03740 4C

Desertification and the Salinity Problem in Australia,
W77-03741 4C

LAND RECLAMATION
Desert Repaired in Southeastern Oregon: A Case Study in Range Management,
W77-03742 4D

LAND RECLMATION
An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

LAND TENURE
Ownership of Water.
W77-03722 6E

Acquisition of Property (Islands).
W77-03723 6E

LAND USE
Coastal Zone Management in Florida,
W77-03699 6E

Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

LAND USE PLANNING
The California Coastal Plan (A Symposium).
W77-03688 6E

LANDFILL
Ground-Water Pollution Near a Landfill,
W77-03991 5B

LANDFILLS
State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

LARVAL GROWTH STAGE
Deleterious Effects of Corexit 9527 on Fertilization and Development,
W77-04050 5C

LEACHATE
Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

LEACHING
On the Counterplan for Treatment of Foul Water Which Oozed Out from A Dumping Ground, (In Japanese),
W77-04066 5D

LEAD
Lead Transport in a River Ecosystem,
W77-03672 5B

Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

LEAF WATER CONTENT
Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

LEAF WATER POTENTIALS
Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

LEAVES
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

The Decomposition of Leaves in Two Southern California Streams,
W77-03829 5B

LEBISTES-RETICULATUS
Toxicological Effects of Diethylnitrosamine (DENA) in Guppies (Lebistes Reticulatus), (In German),
W77-04100 5C

LEGAL ASPECTS
Kravec V State (Interior Land Owners' Right to Bridge State's Drainage Ditch Easement).
W77-03718 6E

The National Flood Insurance Program: Explanation and Legal Implications,
W77-03956 6F

LEGISLATION
Oregon- California Goose Lake Interstate Compact.
W77-03706 6E

The National Flood Insurance Program: Explanation and Legal Implications,
W77-03956 6F

LEPTODORA-KINDTII
Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

LETHAL LIMIT
Effects of Oil on the Amphipod Gammarus Oceanicus,
W77-03777 5C

Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

Study on the Long-Term Effects of Some Detergents on the Sequence of Development of the Sedentary Polychaete, Capitella Capitata (Fabricius), (In French),
W77-04067 5C

Toxicological Effects of Diethylnitrosamine (DENA) in Guppies (Lebistes Reticulatus), (In German),
W77-04100 5C

LEVEE DISTRICTS
Taylor V Board of Levee Commissioners of the Tensas Basin Levee District (A Taking for Levee Purposes).
W77-03707 6E

LEVEES
Taylor V Board of Levee Commissioners of the Tensas Basin Levee District (A Taking for Levee Purposes).
W77-03707 6E

LICENSES (POLLUTION)
Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

LINDANE
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

LINEAR PROGRAMMING
Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Modeling Process Substitutions by LP and MIP,
W77-03933 5G

A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

LINURON
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

LITERATURE SURVEYS
Hydrologic Aspects of Space Investigations of the Earth's Surface (Literature Survey),
W77-03848 7B

LOCAL GOVERNMENTS
Legal Aspects of Coastal Zone Management in Escambia and Santa Rosa Counties, Florida ('Escarosa'),
W77-03697 6E

LOCH ETIVE (SCOTLAND)
Control of Fjordic Deep Water Renewal by Runoff Modification,
W77-03975 2L

LOESS
The Production and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

LONG ISLAND (NY)
Nearshore Currents Off Long Island,
W77-03754 2L

Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

The Production and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

LONG-WAVE RADIATION
On a Derivable Formula for Long-Wave Radiation from Clear Skies,
W77-03638 2B

LOUISIANA
Taylor V Board of Levee Commissioners of the Tensas Basin Levee District (A Taking for Levee Purposes).
W77-03707 6E

Long-Term Chemical Effects of Petroleum in South Louisiana Wetlands - 1. Organic Carbon in Sediments and Waters,
W77-04043 5C

LUMBERING
Effects of Forest Cultural Treatments Upon Streamflow,
W77-03795 4C

MAGNETIC FILTRATION
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

MAGOTHY AQUIFER
Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

MALODOROUS
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

MANAGEMENT
Water Pollution Control Administration, A Memorandum Report on a Reconnaissance Study.
W77-03684 5G

Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

Ground Water Management and Surface Water Development for Irrigation,
W77-03929 4B

Water Quality Management and the Distribution of Emission Rights by Sealed Tender Markets,
W77-03931 5G

Modeling Process Substitutions by LP and MIP,
W77-03933 5G

Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

Demonstration of a State Water Quality Management Information System,
W77-04021 5G

MANGROVE
Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

MANGROVE SWAMPS
Ownership of Submerged Lands in Florida,
W77-03695 6E

Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

Aspects of Red Mangrove Reforestation in Florida,
W77-03950 5G

Suggested Mangrove Transplanting Techniques,
W77-03951 5G

Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

MANGROVES
Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

MAPS
Hydrologic Unit Map--1974, State of Colorado.
W77-03893 7C

MARINE ALGAE
Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

MARINE ANIMALS
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

The Distribution of Short-Chain Halogenated Aliphatic Hydrocarbons in Some Marine Organisms,
W77-04051 5C

MARINE FISH
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

Deleterious Effects of Corexit 9527 on Fertilization and Development,
W77-04050 5C

MARINE SANITATION DEVICES
Marine Sanitation.
W77-03720 6E

MARINE SCIENCE
Applied Mathematical Modelling in Marine Science,
W77-04008 2L

MARKET STRUCTURE
A Note on Effluent Charges and Market Structure,
W77-03955 5G

MARSH GAS
Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

MARSH MANAGEMENT
Legal Protection for Florida Wetlands,
W77-03696 6E

MARSH PLANTS
Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

MARYLAND
Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

MASS SPECTROMETRY
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

MATHEMATICAL MODELS
Computer Modeling,
W77-03679 5B

On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
W77-03680 5B

Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

The Ottawa River Project,
W77-03683 5B

A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

A Mathematical Model for Simulating Water Quality Under Non-Steady State Conditions,
W77-03831 5B

Preoperational and Operational Hydrothermal Field Data Acquisition and Analysis,
W77-03837 5B

Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

Economic Modeling for Water Policy Evaluation.
W77-03924 6A

Water Resource Models: A Historical Summary,
W77-03925 6A

Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

Applied Mathematical Modelling in Marine Science,
W77-04008 2L

Study of the Production Process of Daphnia Longiremis Sars Population from Lake Dalnee by Means of a Mathematical Model, (In Russian),
W77-04055 5C

MATHEMATICAL STUDIES
Mass and Salt Transfers and Halocline Depths in an Estuary,
W77-03751 2L

Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

The Two-Axis Method: A New Method to Calculate Average Precipitation Over A Basin,
W77-03755 2B

On the Description of the Hydrographic State and the Circulation in the Baltic Deep Water,
W77-04006 2L

MEANDERS
Transverse Dispersion in Meandering Channels,
W77-03644 2E

The Deltona Corporation V Board of Trustees of the Internal Improvemenr Trust Fund.
W77-03708 6E

MEASUREMENT
Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

A Method for the Automatic Measurement of Wave Frequency,
W77-03981 2L

Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

MEMBRANE FILTERS
Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

MEMBRANES
Reverse Osmosis for the Treatment of Metal Waste Solutions,
W77-03610 5D

MERCURY
The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

Mercury Transport by Bed Sediment Movements,
W77-03647 5B

Microbial Dealings with Heavy Metals,
W77-03666 5C

Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

MERCURY

Transport and Distribution of Mercury in Sediments,
W77-03669 5B

Bacterial Mobilization of Mercury in Chesapeake Bay,
W77-03670 5C

Interaction Between Aquatic Plants and River Bed Sediments in the Uptake of Mercury from Flowing Water,
W77-03671 5C

The Form of Mercury in Freshwater Fish,
W77-03673 5A

Origin and Fate of Mercury Compounds in Fish,
W77-03674 5B

The Ways of Transport of Mercury to Fish,
W77-03675 5B

Time and Space Dependence of Pollutant Levels in Aquatic Biota, Field Studies,
W77-03676 5B

Mercury Effects on Swimming and Metabolism of Trout,
W77-03678 5C

The Ottawa River Project,
W77-03683 5B

Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

Mercury in Tissues of Mussel Off Southern California,
W77-04060 5C

MERCURY METHYLATION

The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

MEROMIXIS

Meromictic Mechanisms in a Coastal Lake, (In Finnish),
W77-04071 5C

MESA GEOTHERMAL ANOMALY (CALIF)

A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

METABOLISM

Mercury Effects on Swimming and Metabolism of Trout,
W77-03678 5C

The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates,
W77-04030 5C

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri),
W77-04039 5C

Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

METAL

Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

METAL IONS

Dynamics of Interaction of Cations and Fulvic Acid,
W77-03662 2K

METAL REQUIREMENTS

Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri),
W77-04039 5C

METALS

Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

METEOR SATELLITE

Estimate of the Suitability of Television Information from Meteorological Meteor Satellites for Determining Ice Conditions in Lakes and Reservoirs,
W77-03765 2C

METEOROLOGICAL DATA

The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

METHANE

Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

METHODOLOGY

On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
W77-03680 5B

Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

METHYL MERCURY

The Form of Mercury in Freshwater Fish,
W77-03673 5A

METHYLMERCURIC CHLORIDE

Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

METHYLMERCURY

A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

MEXICO

Environmental Protection in Mexico and Canada,
W77-03698 6E

MICHIGAN

Kempf V Ellixson (Determination of Riparian Rights Where Land is Separated from Body of Water by Public Highway).
W77-03710 6E

Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

MICROANALYSIS

Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

MICROBES

Some Problems of Sanitary Microbiology, (In Russian),
W77-04085 5A

MICROBIAL DEGRADATION

The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

Microbial Processes of Phenol Degradation in the Volga and its Reservoirs, (In Russian),
W77-04064 5C

MICROBIOLOGY

The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

Some Problems of Sanitary Microbiology, (In Russian),
W77-04085 5A

Microbiological Characteristics of the Ros' River and Some of Its Tributaries, (In Russian),
W77-04093 5C

MICROORGANISMS

Some Problems of Sanitary Microbiology, (In Russian),
W77-04085 5A

The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

MICROSTRUCTURE SPECTRA

Spectrum of Small-Scale Oceanic Temperature Gradients,
W77-03979 2L

MINE WASTES

Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

MINERAL CYCLING

Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

MINERAL RESIDUES

Thyroid Modifications in Rats after Administration of Mineral Residue from Drinking Water, (In French),
W77-04089 5C

MINERALS
Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

MISSISSIPPI RIVER
Heavy Metals in the Lower Mississippi,
W77-03654 5B

River and Cooling Water Temperature Fluctuations,
W77-03834 5B

MISSISSIPPI RIVER VALLEY
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

MISSOURI RIVER
Barnes V United States (Compensation for Flowage Easement Taken Over Plaintiffs' Lands).
W77-03709 6E

MISSOURI RIVER BASIN PROJECT
Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

MIXED INTEGER PROGRAMMING
Modeling Process Substitutions by LP and MIP,
W77-03933 5G

MIXING
Mass and Salt Transfers and Halocline Depths in an Estuary,
W77-03751 2L

Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

MIXING LENGTH
River and Cooling Water Temperature Fluctuations,
W77-03834 5B

MODE OF ACTION
Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

MODEL PARAMETERS
Physical and Economic Parameters for Planning Regional Wastewater Treatment Systems,
W77-04010 5D

MODEL STUDIES
On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
W77-03680 5B

Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

The Ottawa River Project,
W77-03683 5B

Theoretical Model of River Ice Jams,
W77-03745 2C

Runoff Files for Flood Hydrograph Simulation,
W77-03748 2E

A Numerical Investigation of the Circulation in the Norwegian Sea,
W77-03750 2L

Mean Circulation in Shallow Seas,
W77-03753 2L

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

A Comparison of Modeling and Statistical Evaluation of Hydrologic Change,
W77-03800 4D

Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

Evaporation and Advection I: Evaporation from Extensive Homogeneous Surfaces,
W77-03859 2D

Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

Preliminary Digital Model of Ground-Water Flow in the Madison Group, Poweder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

Modeling and Information Handling in Environmental Science,
W77-03926 5G

Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Examination of Environmental Policies Using Production and Pollution Microparameter Distributions,
W77-03961 6G

Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

Control of Fjordic Deep Water Renewal by Runoff Modification,
W77-03975 2L

Spectra and Coherence of Wind-Generated Internal Waves,
W77-03982 2L

Numerical Model Studies of the Tides Between Vancouver Island and the Mainland Coast,
W77-03984 2L

Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

MOISTURE CONTENT
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

Effect of Moisture Content on Soil Consistency,
W77-03631 2G

Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

MOISTURE DEFICIT
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

MOISTURE STRESS
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

Isolation and Characterization of Drought Tolerance in a Grain Sorghum (Sorghum Bicolor (L) Moench) Randommating Population,
W77-03623 2I

Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

MOISTURE TENSION
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

MOISTURE UPTAKE
Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

MOLLUSKS
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

The Kinetics of Accumulation and Excretion of Ferric Hydroxide in Mytilus Edulis (L.) and its Distribution in the Tissues,
W77-04028 5C

Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

MONITORING
A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

An Automatic, Continuous, Modular Wastewater Monitoring System,
W77-03801 5A

Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

An Assessment of the Pollution of Cornish Coastal Waters,
W77-04061 5B

MORTALITIES
Relationships of Epibiotic Fouling and Mortalities of Eggs of the Dungeness Crab (Cancer Magister),
W77-04040 5C

MOUNTAINS
Role of the Snow Cover in the Nature of Northern Landscapes and Its Physical Properties,
W77-03988 2C

MULTI-OBJECTIVE PLANNING
Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

MULTIATTRIBUTE UTILITY THEORY
Preference Models of Environmental Impact,
W77-04020 6G

MULTIPLE OBJECTIVES
Preference Models of Environmental Impact,
W77-04020 6G

MULTIPLE-PURPOSE PROJECTS
Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

Multipurpose Development on the Tisza River.
W77-03957 4A

MULTIPLE-PURPOSE RESERVOIRS
Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

MULTIVARIATE ANALYSIS
Multivariable Flood Level Frequency Distributions,
W77-03996 8B

MUNICIPAL WATER
Clear Lake Apartments, Inc V Clear Lake Utilities (Exclusive Right to Provide Water Not a Covenant Running With the Land).
W77-03716 6E

MUSSELS
The Kinetics of Accumulation and Excretion of Ferric Hydroxide in Mytilus Edulis (L.) and its Distribution in the Tissues,
W77-04028 5C

Mercury in Tissues of Mussel Off Southern California,
W77-04060 5C

MYOPSIDA
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

NARES STRAIT (CANADA)
Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

NATIONAL FLOOD INSURANCE PROGRAM
Assessment of Flood Management Alternatives Against Social Performance Criteria, Phase II Report,
W77-03774 6F

The National Flood Insurance Program: Explanation and Legal Implications,
W77-03956 6F

NATURAL FLOW DOCTRINE
Ownership of Water.
W77-03722 6E

NATURAL RESOURCES
ERTS-1, A New Window on Our Planet,
W77-03875 7B

Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

NAVIGABILITY TESTS
Ownership of Submerged Lands in Florida,
W77-03695 6E

NAVIGABLE IN FACT
The Deltona Corporation V Board of Trustees of the Internal Improvemenr Trust Fund.
W77-03708 6E

NAVIGABLE WATER
Artificial and Natural Lakes,
W77-03694 6E

NAVIGABLE WATERS
Ownership of Submerged Lands in Florida,
W77-03695 6E

The Deltona Corporation V Board of Trustees of the Internal Improvemenr Trust Fund.
W77-03708 6E

Damages Compensable Under Federal Maritime Law for Injuries Caused by Discharge of Oil into Navigable Waters,
W77-03711 5G

Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

NEARSHORE CIRCULATION
Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

NEARSHORE ENVIRONMENTS
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

NEBRASKA
Barnes V United States (Compensation for Flowage Easement Taken Over Plaintiffs' Lands).
W77-03709 6E

Water Resources Data for Nebraska, Water Year 1975,
W77-03885 7C

Magnitude and Frequency of Floods in Nebraska,
W77-03886 2E

NET BACK RADIATION
Lake Erie Terrestrial Radiation,
W77-03858 2H

NETWORK DESIGN
Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

NETWORKS
Least Cost Control Strategies in Urban Drainage Design -- A Dynamic Programming Approach,
W77-04007 4A

NEUTRON ACTIVATION ANALYSIS
Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

NEVAGISSEY BAY (U.K.)
The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

NEW MEXICO
Augmentation of 1968-1972 Winter Storms in New Mexico,
W77-03838 3B

Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

NEW YORK
Boyer V Dept of Health (Location of Leach Field Relative to Water Supply).
W77-03713 6E

Kattor V Sabatini (No Right of Diverting Surface Water by Artificial Channel).
W77-03714 6E

Kravec V State (Interior Land Owners' Right to Bridge State's Drainage Ditch Easement).
W77-03718 6E

Nearshore Currents Off Long Island,
W77-03754 2L

Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

The Production and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

NEW YORK BIGHT
Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

Distribution and Abundance of Heavy Metals in Finfish, Invertebrates and Sediments Collected at a Deep Water Disposal Site,
W77-04046 5B

NIGERIA
A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
W77-03756 2B

NITRATES
Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

Water Pollution of the Rivers Flowing Eastwards into the Bay of Ise, (In Japanese),
W77-04080 5B

NITROGEN
Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

NITROGEN COMPOUNDS
Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

NORTH BISCAYNE BAY (FLA)
Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

NORTH CAROLINA
A Mathematical Model for Simulating Water Quality Under Non-Steady State Conditions,
W77-03831 5B

Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

NORTH SEA
Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

NORTHEAST U.S.
A Compendium of Lake and Reservoir Data Collected by the National Eutrophication Survey in the Northeast and Northcentral United States.
W77-03784 5C

NORTHERN IRELAND
An Investigation into the Effects of Forestry Plantations on the Water Quality of Upland Reservoirs in Northern Ireland,
W77-03840 5B

NORWAY
Waterfowl and Acid Precipitation in Norway, (In Danish),
W77-03841 5C

NORWAY (AUSTERDALSISEN)
Glacial Lake Sedimentation, Austerdalsisen, Norway,
W77-04005 2J

NORWEGIAN SEA
A Numerical Investigation of the Circulation in the Norwegian Sea,
W77-03750 2L

NOVA SCOTIA
Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

NUCLEAR POWERPLANTS
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

NUCLEAR WASTES
The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

NUTRIENTS
A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

OB' RIVER (USSR)
Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region),
W77-03989 4A

OBSERVATION WELLS
Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

OCEAN CIRCULATION
Mean Circulation in Shallow Seas,
W77-03753 2L

Evidence of a Westward-Flowing 'Subarctic Countercurrent' in the North Pacific Ocean,
W77-03760 2L

Measurements of a Small Near-Bottom Cyclonic Circulation Near the Gulf Stream Axis,
W77-03842 2L

OCEAN CURRENTS
Nearshore Currents Off Long Island,
W77-03754 2L

Evidence of a Westward-Flowing 'Subarctic Countercurrent' in the North Pacific Ocean,
W77-03760 2L

Measurements of a Small Near-Bottom Cyclonic Circulation Near the Gulf Stream Axis,
W77-03842 2L

OCEAN WAVES
Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

OCEAN WEATHER STATIONS
Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

OCEANOGRAPHY
An Historical Sketch of Physical Oceanography in Canada,
W77-03759 2L

Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

OCEANS
The International Law of Scientific Research in the Oceans,
W77-03687 6E

A Numerical Investigation of the Circulation in the Norwegian Sea,
W77-03750 2L

Spectrum of Small-Scale Oceanic Temperature Gradients,
W77-03979 2L

OCTOPODA
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

ODOR
Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici),
W77-03603 5D

ODORS
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

OEGOPSIDA
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

OIL
Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

Hydrocarbons in a Wilderness Lake,
W77-04048 5B

OIL POLLUTION
Effects of Oil on the Amphipod Gammarus Oceanicus,
W77-03777 5C

Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

OIL POLLUTION

Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

Coastal Marine Pollution and Fish,
W77-03902 5C

Development of Fast Current Oil Response System,
W77-03904 5G

Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

An Oil Slick Sampling System,
W77-03909 5A

Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

High Seas Oil Pollution: Particulate Petroleum Residues in the North Atlantic,
W77-04025 5B

Uptake and Retention of Kuwait Crude Oil and its Effects on Oxygen Uptake by the Soft-Shell Clam, Mya Arenaria,
W77-04026 5C

Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates,
W77-04030 5C

The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

Long-Term Chemical Effects of Petroleum in South Louisiana Wetlands - 1. Organic Carbon in Sediments and Waters,
W77-04043 5C

Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

Deleterious Effects of Corexit 9527 on Fertilization and Development,
W77-04050 5C

Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

Molecular Test for Oil Pollution in Surface Sediments,
W77-04058 5B

Some Effects of Petroleum on Estuarine and Marine Micro-Organisms,
W77-04063 5C

OIL POLLUTION ACT

Contingency Plan for Spills of Oil and Hazardous Materials for Inland Waters of Region III.
W77-03700 5G

OIL RECOVERY SYSTEMS

Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

OIL SPILLS

Contingency Plan for Spills of Oil and Hazardous Materials for Inland Waters of Region III.
W77-03700 5G

Damages Compensable Under Federal Maritime Law for Injuries Caused by Discharge of Oil into Navigable Waters,
W77-03711 5G

Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

Development of Fast Current Oil Response System,
W77-03904 5G

Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

An Oil Slick Sampling System,
W77-03909 5A

Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

OILSEED CROPS

Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

OILY WATER

Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

OKA RIVER (USSR)

Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

OKLAHOMA

Protection of Water Supply.
W77-03719 6E

Deleterious Substances in Streams.
W77-03721 6E

Ownership of Water.
W77-03722 6E

Acquisition of Property (Islands).
W77-03723 6E

Water and Sewage.
W77-03724 6E

Water Transportation Service.
W77-03725 6E

Condemnation of Land and Water Rights.
W77-03726 6E

Levees, Drains and Ditches,
W77-03727 6E

OLIGOPOL GAME

Application of Game Theory in Water Management,
W77-04009 6A

ON-SITE DATA COLLECTIONS

An Investigation into the Effects of Forestry Plantations on the Water Quality of Upland Reservoirs in Northern Ireland,
W77-03840 5B

ON-SITE INVESTIGATIONS

Largescale Ripples of the Lower Wabash River,
W77-03761 2J

A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

Glacial Lake Sedimentation, Austerdalsisen, Norway,
W77-04005 2J

ONTARIO

Hydrocarbons in a Wilderness Lake,
W77-04048 5B

ONTOGENESIS

Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri),
W77-04039 5C

OPEN CHANNEL FLOW
Supercritical Flow Over Sills,
W77-03747 8B

Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

OPERATING COSTS
A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

OPTIMIZATION
Economic Modeling for Water Policy Evaluation.
W77-03924 6A

Multilevel Incremental Dynamic Programing,
W77-03937 6A

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

OREGON
Klamath River Basin Compact.
W77-03705 6E

Oregon- California Goose Lake Interstate Compact.
W77-03706 6E

State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

Desert Repaired in Southeastern Oregon: A Case Study in Range Management,
W77-03742 4D

Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

ORGANIC COMPOUNDS
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

Distribution of Low-Molecular-Weight Hydrocarbons in Southern Beaufort Sea,
W77-03793 5B

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Hydrocarbons in a Wilderness Lake,
W77-04048 5B

ORGANIC MATTER
The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

Concentration of Organic Substances in Water as a Factor Controlling the Occurrence of Some Ciliate Species,
W77-03839 5C

Bacterial Assimilation of Organic Matter in Waters with Various Pollution Levels, (In Russian),
W77-04081 5B

The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

ORGANIC PESTICIDES
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

ORGANIC SOILS
The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

ORGANIC WASTES
Concentration of Organic Substances in Water as a Factor Controlling the Occurrence of Some Ciliate Species,
W77-03839 5C

ORGANOCHLORINES
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

ORGANOPHOSPHORUS PESTICIDES
Behavior of Pathogenic and Sanitary-Indicator Bacteria Under Conditions of Water Pollution by Organophosphorus Pesticides, (In Russian),
W77-04099 5C

ORTHOPHOSPHATES
Reaction Products of Polyphosphates and Orthophosphates with Soils and Influence on Uptake of Phosphorus by Plants,
W77-03636 3F

Phosphorus Removal from Wastewater,
W77-03867 5D

OTTAWA RIVER (CANADA)
The Distribution and Transport of Bed Sediments and Persistent Pollutants in the Ottawa River, Canada,
W77-03645 5B

Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

Microbial Dealings with Heavy Metals,
W77-03666 5C

Computer Modeling,
W77-03679 5B

OTTAWA RIVER PROJECT (CANADA)
The Ottawa River Project,
W77-03683 5B

OUTER CONTINENTAL SHELF
Coastal Marine Pollution and Fish,
W77-03902 5C

Development of Fast Current Oil Response System,
W77-03904 5G

Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

An Oil Slick Sampling System,
W77-03909 5A

Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

OVERDRAFT
Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

OVERLAND FLOW
Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

OWNERSHIP OF BEDS
Artificial and Natural Lakes,
W77-03694 6E

Ownership of Submerged Lands in Florida,
W77-03695 6E

OXIDATION
Wet Oxidation of Clarification Sludge and Pulp Effluent by the Zimpro Process (Nassoxydation von Klaerschlamm und Zellstoffablauge mit dem Zimpro-Verfahren),
W77-03823 5D

OXYGEN
Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

OXYGEN ISOTOPES
Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

OXYGEN UTILIZATION
Tall Order in Waste Treatment,
W77-03602 5D

OXYGENATION
Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di

Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici),
W77-03603 5D

OYSTERS
Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

OZONE
Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

Studies on the Recurrence of Bacterial Flora in Drinking Water After Ozonization, (In German),
W77-04074 5F

OZONIZATION
Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

Studies on the Recurrence of Bacterial Flora in Drinking Water After Ozonization, (In German),
W77-04074 5F

PACIFIC OCEAN
Evidence of a Westward-Flowing 'Subarctic Countercurrent' in the North Pacific Ocean,
W77-03760 2L

Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

PANDALUS SP.
Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

PAR POND (GEO)
A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

PARLANGE EQUATION
Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

PARTICLE SIZE
Stability of Channel Beds by Amoring,
W77-03836 8B

PASTURE MANAGEMENT
Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

PASTURES
Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

PATENTS
Treatment of Putrefactive Meat and Fish Waste -- for Preparation of Manure, Animal Feeds and Fuel Oil,
W77-03608 5D

Solidifying Sludge Containing Heavy Metals -- by Treating with Sulphur Compounds, Colloidal Sulphur and Bituminous Emulsion.
W77-03611 5D

Purifying and Regenerating Gaseous and Fluid Phase Effluents -- Such as Ammonia Mixtures from Wool Processing, Mercerising Etc.
W77-03617 5D

Chlorine-Based Bleachery Effluent Treatment,
W77-03806 5D

Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

Hose or Pipe for Sprinkling or Irrigation,
W77-03864 3F

Adsorption Biooxidation Treatment of Waste Waters to Remove Contaminants Thereform,
W77-03865 5D

Method of Disposing Sludges Containing Soluble Toxic Materials,
W77-03866 5E

Phosphorus Removal from Wastewater,
W77-03867 5D

Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

Device for Purifying Sewage,
W77-03869 5D

Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

Irrigation Pipes with Dripper Units and Method of its Manufacture,
W77-03871 3F

Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

Method and Apparatus for Anaerobic Fermentation,
W77-03873 5D

PATH OF POLLUTANT
Distribution and Abundance of Heavy Metals in Finfish, Invertebrates and Sediments Collected at a Deep Water Disposal Site,
W77-04046 5B

PATH OF POLLUTANTS
Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems.
W77-03642 5B

The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

The Distribution and Transport of Bed Sediments and Persistent Pollutants in the Ottawa River, Canada,
W77-03645 5B

The Role of Flocculation in the Transport of Particulate Pollutants in the Marine Environment,
W77-03646 5B

Mercury Transport by Bed Sediment Movements,
W77-03647 5B

Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

Heavy Metal Pollutants in the Sediments of the Rhone River,
W77-03651 5B

Trace Metal Pollution from a Metropolitan Area: Sources and Accumulation in the Lower Fraser River and Estuary,
W77-03652 5B

Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

Water-Sediment Distribution of Chlorinated Hydrocarbon Pesticides in Various Environmental Conditions,
W77-03660 5B

Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

Transport and Distribution of Mercury in Sediments,
W77-03669 5B

Origin and Fate of Mercury Compounds in Fish,
W77-03674 5B

The Ways of Transport of Mercury to Fish,
W77-03675 5B

Time and Space Dependence of Pollutant Levels in Aquatic Biota, Field Studies,
W77-03676 5B

Computer Modeling,
W77-03679 5B

On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
W77-03680 5B

The Ottawa River Project,
W77-03683 5B

The Costs and Effects of Chronic Exposure to Low-Level Pollutants in the Environment,
W77-03701 6G

A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

A Mathematical Model for Simulating Water Quality Under Non-Steady State Conditions,
W77-03831 5B

Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

The Kinetics of Accumulation and Excretion of Ferric Hydroxide in Mytilus Edulis (L.) and its Distribution in the Tissues,
W77-04028 5C

Weed Control and the Environment, (In French),
W77-04041 5B

Radioecological Study of Charophyta, (In Russian),
W77-04068 5C

PATHOGENIC BACTERIA
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

PATUXENT RIVER (MD)
Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

PEKILO PROCESS
Utilization of the Spent Sulfite Liquor Components in the Pekilo Protein Process and the Influence of the Process upon the Environmental Problems of a Sulfite Mill,
W77-03816 5D

PENALTIES (LEGAL)
Damages Compensable Under Federal Maritime Law for Injuries Caused by Discharge of Oil into Navigable Waters,
W77-03711 5G

PENNSYLVANIA
Demonstration of a State Water Quality Management Information System,
W77-04021 5G

PENSACOLA ESTUARY (FLA)
Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

PEPTONE
Concentration of Organic Substances in Water as a Factor Controlling the Occurrence of Some Ciliate Species,
W77-03839 5C

PERMITS
Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

PESTICIDE RESIDUES
Partitioning and Uptake of Pesticides in Biological Systems,
W77-03659 5C

Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian),
W77-04097 5C

Behavior of Pathogenic and Sanitary-Indicator Bacteria Under Conditions of Water Pollution by Organophosphorus Pesticides, (In Russian),
W77-04099 5C

PESTICIDES
Adsorption of C14-DDT to Particle Surfaces,
W77-03658 5B

Water-Sediment Distribution of Chlorinated Hydrocarbon Pesticides in Various Environmental Conditions,
W77-03660 5B

Coastal Marine Pollution and Fish,
W77-03902 5C

PETROCHEMICAL WASTES
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

PETROLEUM BIODEGRADATION
The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

PETROLEUM DEGRADING ALGAE
Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

PETROLEUM TOXICITY
The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates,
W77-04030 5C

PHENOLS
Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

Microbial Processes of Phenol Degradation in the Volga and its Reservoirs, (In Russian),
W77-04064 5C

PHOSPHATES
Phosphorus Removal from Wastewater,
W77-03867 5D

Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

Water Pollution of the Rivers Flowing Eastwards into the Bay of Ise, (In Japanese),
W77-04080 5B

PHOSPHOROUS
Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

PHOSPHORUS
Reaction Products of Polyphosphates and Orthophosphates with Soils and Influence on Uptake of Phosphorus by Plants,
W77-03636 3F

Phosphorus Removal from Wastewater,
W77-03867 5D

PHOTOGRAMMETRY
Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

PHOTOSYNTHESIS
Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

PHYLACTOLEMA
Role of Populations of Plumatella Fungosa (Pallas) (Bryozoa, Phylactolema) in the Self-Purification of a Pond and a Stream, (In French),
W77-04083 5G

PHYSICAL OCEANOGRAPHY
An Historical Sketch of Physical Oceanography in Canada,
W77-03759 2L

PHYTOPLANKTON
Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Marine Phytoplankton Growth in High Concentrations of Pulp Mill Effluent,
W77-03798 5C

Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

PHYTOTOXICITY
Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian),
W77-04097 5C

PHYTPLANKTON
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

PIKES
Time and Space Dependence of Pollutant Levels in Aquatic Biota, Field Studies,
W77-03676 5B

PILOT PLANTS
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

PIPE FLOW
Flow in Corrugated Pipes,
W77-03744 8B

Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

PIPES
Hose or Pipe for Sprinkling or Irrigation,
W77-03864 3F

PLANNING
Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

Social Well-Being and Water Resources Planning,
W77-04013 6B

PLANT GROWTH
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

PLANTING MANAGEMENT
Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

Suggested Mangrove Transplanting Techniques,
W77-03951 5G

Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

PLASMIDS
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

PLASTICS INDUSTRY
Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

PLUMATELLA-FUNGOSA
Role of Populations of Plumatella Fungosa (Pallas) (Bryozoa, Phylactolema) in the Self-Purification of a Pond and a Stream, (In French),
W77-04083 5G

POINT SOURCE POLLUTION
Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

POLAND
Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

POLAR REGIONS
Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

POLAR URAL MOUNTAINS (USSR)
Role of the Snow Cover in the Nature of Northern Landscapes and Its Physical Properties,
W77-03988 2C

POLITICAL ASPECTS
The International Law of Scientific Research in the Oceans,
W77-03687 6E

POLLUTANT IDENTIFICATION
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

Sulphide Measurement Using Ammonium Molybdate,
W77-03657 5A

Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

Identification of 1,1,1-Trichloroacetone (1,1,1-Trichloropropanone) in Two Drinking Waters: A Known Precursor in Haloform Reaction,
W77-03794 5A

Identification of Gasoline Contamination of Groundwater by Gas Chromatography,
W77-03796 5A

An Automatic, Continuous, Modular Wastewater Monitoring System,
W77-03801 5A

Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

An Oil Slick Sampling System,
W77-03909 5A

Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

Hydrocarbons in a Wilderness Lake,
W77-04048 5B

Molecular Test for Oil Pollution in Surface Sediments,
W77-04058 5B

Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

Some Problems of Sanitary Microbiology, (In Russian),
W77-04085 5A

Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

Microcalorimetric Investigations in Polluted Surface Waters, (In German),
W77-04091 5A

The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

POLLUTANTS
Deleterious Substances in Streams.
W77-03721 6E

POLLUTION ABATEMENT
Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

Development of Fast Current Oil Response System,
W77-03904 5G

The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

A Note on Effluent Charges and Market Structure,
W77-03955 5G

Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

Examination of Environmental Policies Using Production and Pollution Microparameter Distributions,
W77-03961 6G

The Symmetry of Effluent Charges and Subsidies for Pollution Control,
W77-03962 5G

Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

POLLUTION TAXES (CHARGES)

A Note on Effluent Charges and Market Structure,
W77-03955 5G

Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

Examination of Environmental Policies Using Production and Pollution Microparameter Distributions,
W77-03961 6G

The Symmetry of Effluent Charges and Subsidies for Pollution Control,
W77-03962 5G

POLYACRYLAMIDE

Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

POLYCHAETES

Study on the Long-Term Effects of Some Detergents on the Sequence of Development of the Sedentary Polychaete, Capitella Capitata (Fabricius), (In French),
W77-04067 5C

POLYCHLORINATED BIPHENYLS

Time and Space Dependence of Pollutant Levels in Aquatic Biota, Field Studies,
W77-03676 5B

Trends of PCB and DDT in Fish and Aquatic Birds,
W77-03677 5B

Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

POLYMERS

The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

POLYPHOSPHATES

Reaction Products of Polyphosphates and Orthophosphates with Soils and Influence on Uptake of Phosphorus by Plants,
W77-03636 3F

PONDING

Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

PORE PRESSURE

Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

PORES

Reverse Osmosis for the Treatment of Metal Waste Solutions,
W77-03610 5D

POROUS MEDIA

Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

POTABLE WATER

Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

Identification of 1,1,1-Trichloroacetone (1,1,1-Trichloropropanone) in Two Drinking Waters: A Known Precursor in Haloform Reaction,
W77-03794 5A

Standard 'Potable Water' (All-Union State Standard 2874-73, A New Stage in the Development of Water Hygiene, (In Russian),
W77-03853 5G

Experimental and Field Studies in Hygienic Assessment of Drinking Water Containing Boron, (In Russian),
W77-04033 5G

Studies on the Recurrence of Bacterial Flora in Drinking Water After Ozonization, (In German),
W77-04074 5F

Thyroid Modifications in Rats after Administration of Mineral Residue from Drinking Water, (In French),
W77-04089 5C

The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

POTENTIOMETERS

Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

POWERPLANTS

An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

Preoperational and Operational Hydrothermal Field Data Acquisition and Analysis,
W77-03837 5B

PRE-IMPOUNDMENT

Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

PRECIPITATION (ATMOSPHERIC)

Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

The Two-Axis Method: A New Method to Calculate Average Precipitation Over A Basin,
W77-03755 2B

A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
W77-03756 2B

PREFERENCE MODELS

Preference Models of Environmental Impact,
W77-04020 6G

PREFERENCES (WATER RIGHTS)

Preference Models of Environmental Impact,
W77-04020 6G

PRESSURE

Analytic Equation of State for Sea Water,
W77-03770 1B

PRICING

Water Quality Management and the Distribution of Emission Rights by Sealed Tender Markets,
W77-03931 5G

Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

PRIMARY PRODUCTIVITY

Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

Primary Production of Green Filamentous Algae from the Kiev Reservoir, (In Russian),
W77-04070 5C

PRINCIPAL COMPONENT ANALYSIS
Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

PRIOR APPROPRIATION
The Effects of Streamflow Variation on Production and Income of Irrigated Farms Operating Under the Doctrine of Prior Appropriation,
W77-03637 3F

California Water Law in Perspective,
W77-03689 6E

PROBABILITY
Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

PROBABLE MAXIMUM PRECIPITATION
A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
W77-03756 2B

PRODUCTIVITY
Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

Study of the Production Process of Daphnia Longiremis Sars Population from Lake Dalnee by Means of a Mathematical Model, (In Russian),
W77-04055 5C

Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

PROJECT BENEFITS
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

PROJECT PLANNING
Analysis of the National Flood Insurance Act,
W77-03693 6E

PROJECT PURPOSES
Analysis of the National Flood Insurance Act,
W77-03693 6E

PROJECT SCALE
Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

PROJECTIONS
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

PROJECTS
Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

PROTECTION
Legal Protection for Florida Wetlands,
W77-03696 6E

Environmental Protection in Mexico and Canada,
W77-03698 6E

PROTEINS
Utilization of the Spent Sulfite Liquor Components in the Pekilo Protein Process and the Influence of the Process upon the Environmental Problems of a Sulfite Mill,
W77-03816 5D

PROTOTHECA ZOPFI
Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

PSEUDOMONAS AERUGINOSA
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

PUBLIC BENEFITS
General State Powers over Water.
W77-03703 6E

PUBLIC HEALTH
Water and Sewage.
W77-03724 6E

Standard 'Potable Water' (All-Union State Standard 2874-73, A New Stage in the Development of Water Hygiene, (In Russian),
W77-03853 5G

Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

PUBLIC TRUST
The Deltona Corporation V Board of Trustees of the Internal Improvemenr Trust Fund.
W77-03708 6E

PUBLIC TRUST DOCTRINE
Ownership of Submerged Lands in Florida,
W77-03695 6E

PUBLIC TRUST DOCTRINES
Artificial and Natural Lakes,
W77-03694 6E

PUBLICATIONS
Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems.
W77-03642 5B

PULP AND PAPER INDUSTRY
Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

Reduction of Fresh Water Consumption at the Kondopoga Mill for the Manufacture of Pulp (Opyt raboty kondopozhnogo kombinata po cokrashcheniyu raschoda svezhei vody v tsellyuloznom proizvodstve),
W77-03790 3E

Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

Design of an Efficient Water System for a Kraft Pulp Mill,
W77-03804 5D

A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

Effect of Residues from Effluent Treatment During Solid Board Manufacture (Auswirkung von Rueckstanden aus der Abwasserreinigung bei der Vollpappenerzeugung),
W77-03819 5D

PULP WASTES
Solvent and Solvency -- A Solution to Sludge Problems,
W77-03616 5D

Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Marine Phytoplankton Growth in High Concentrations of Pulp Mill Effluent,
W77-03798 5C

Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

Electrochemical Purification of Effluents from the Manufacture of Sulfite and Kraft Pulps (Elektrokhimicheskaya ochistka stochnykh vod ot proizvodstva sul'fitnoi i sul'fatnoi tsellyulozy),
W77-03815 5D

Possible uses for Fibrous Sludges from the Pulp and Paper Industry,
W77-03817 5E

Experiences in Closing the Water System in a Paper and Board Mill (Erfahrungen bei der Kreislaufschliessung einer Papier- und Kartonfabrik),
W77-03818 5D

Operating Experiences with an Electrolytic Method for Purifying NSSC (Neutral Sulfite Semichemical) Effluent (Betriebserfahrungen mit einem elektrolytischen Verfahren bei der Reinigung von NSSC-Abwasser),
W77-03820 5D

Wet Oxidation of Clarification Sludge and Pulp Effluent by the Zimpro Process (Nassoxydation von Klaerschlamm und Zellstoffablauge mit dem Zimpro-Verfahren),
W77-03823 5D

Biological Effluent Clarification in the Paper Mill Circulation System (Biologische Abwasseraufbereitung im Kreislauf einer Papierfabrik),
W77-03824 5D

PURE WATER
Analytic Equation of State for Sea Water,
W77-03770 1B

PURE WATER PROPERTIES
Analytic Equation of State for Sea Water,
W77-03770 1B

QUALITY CONTROL
Institutions and Objectives on the Water, Energy, Environment Interface,
W77-03934 6B

QUASI-PUBLIC GOODS
Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

RADIATION
On a Derivable Formula for Long-Wave Radiation from Clear Skies,
W77-03638 2B

Lake Erie Terrestrial Radiation,
W77-03858 2H

RADIOACTIVE WASTE DISPOSAL
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

RADIOACTIVITY
Radioecological Study of Charophyta, (In Russian),
W77-04068 5C

Thyroid Modifications in Rats after Administration of Mineral Residue from Drinking Water, (In French),
W77-04089 5C

RADIOECOLOGY
Radioecological Study of Charophyta, (In Russian),
W77-04068 5C

RADIONUCLIDES
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

Coastal Marine Pollution and Fish,
W77-03902 5C

RAINBOW TROUT
Mercury Effects on Swimming and Metabolism of Trout,
W77-03678 5C

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri),
W77-04039 5C

The Effect of Ammonia Exposure on Gill Structure of the Rainbow Trout (Salmo Gairdneri),
W77-04056 5C

RAINFALL
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
W77-03756 2B

Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

RAINFALL INTENSITY
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

Intensity of Rainfall in Clermone-Ferrand, (In French),
W77-04032 2B

RAINFALL SIMULATORS
An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

RAINFALL *SOIL EROSION
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

RANGE MANAGEMENT
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

Desert Repaired in Southeastern Oregon: A Case Study in Range Management,
W77-03742 4D

RECLAMATION
Validity, Construction, and Application of S 5 of Reclamation Law of 1902 (43 USCS S 431),
W77-03712 6E

RECLAMATION ACT OF 1902
Validity, Construction, and Application of S 5 of Reclamation Law of 1902 (43 USCS S 431),
W77-03712 6E

RECREATION
Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

RECREATION DEMAND
Estimating Net Benefits of Recreation Under Conditions of Excess Demand,
W77-03964 6D

RECYCLING
Reduction of Fresh Water Consumption at the Kondopoga Mill for the Manufacture of Pulp (Opyt raboty kondopozhnogo kombinata po cokrashcheniyu raschoda svezhei vody v tsellyuloznom proizvodstve),
W77-03790 3E

Effect of Residues from Effluent Treatment During Solid Board Manufacture (Auswirkung von Rueckstanden aus der Abwasserreinigung bei der Vollpappenerzeugung),
W77-03819 5D

RED MANGROVE
Aspects of Red Mangrove Reforestation in Florida,
W77-03950 5G

Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

REDLANDS (CALIF)
Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

REFORESTATION
Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

Aspects of Red Mangrove Reforestation in Florida,
W77-03950 5G

Suggested Mangrove Transplanting Techniques,
W77-03951 5G

Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

REGIONAL ANALYSIS
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

REGIONAL DEVELOPMENT
Physical and Economic Parameters for Planning Regional Wastewater Treatment Systems,
W77-04010 5D

REGULATION
Coastal Zone Management in Florida,
W77-03699 6E

Water Transportation Service.
W77-03725 6E

Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

RELIABILITY
Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

REMOTE SENSING
Estimate of the Suitability of Television Information from Meteorological Meteor Satellites for Determining Ice Conditions in Lakes and Reservoirs,
W77-03765 2C

Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

Some Problems in the Study of the Inundation of River Flood Plains by Aerospace Methods,
W77-03847 4A

Hydrologic Aspects of Space Investigations of the Earth's Surface (Literature Survey),
W77-03848 7B

Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

ERTS-1, A New Window on Our Planet,
W77-03875 7B

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

Operational Applications of Satellite Snowcover Observations and Landsat Data Collection Systems Operations in Central Arizona,
W77-03971 2C

RENT
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

RENT MAXIMIZATION
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

RESEARCH AND DEVELOPMENT
The International Law of Scientific Research in the Oceans,
W77-03687 6E

RESERVOIR EVAPORATION
Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

RESERVOIR LEAKAGE
Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

RESERVOIR OPERATION
Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

RESERVOIR STORAGE
Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

RESERVOIR-SYSTEM MODELS
Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

RESERVOIRS
Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

Estimate of the Suitability of Television Information from Meteorological Meteor Satellites for Determining Ice Conditions in Lakes and Reservoirs,
W77-03765 2C

An Investigation into the Effects of Forestry Plantations on the Water Quality of Upland Reservoirs in Northern Ireland,
W77-03840 5B

Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

RESINS
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

RESOURCES DEVELOPMENT
An Oil Slick Sampling System,
W77-03909 5A

Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

RESPIRATION
The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

Mercury Effects on Swimming and Metabolism of Trout,
W77-03678 5C

Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

RESPIROMETERS
A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

RETURN FLOW
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

REVEGETATION
Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

Efforts in Marine Revegetation in Artificial Habitats,
W77-03949 5G

REVERSE OSMOSIS
Reverse Osmosis for the Treatment of Metal Waste Solutions,
W77-03610 5D

REVIEWS
Hydrologic Aspects of Space Investigations of the Earth's Surface (Literature Survey),
W77-03848 7B

Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

RHODE ISLAND
Ground-Water Pollution Near a Landfill,
W77-03991 5B

RHONE RIVER (FRANCE)
Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

RHONE RIVER (SWITZ)
Heavy Metal Pollutants in the Sediments of the Rhone River,
W77-03651 5B

RICHARDSON NUMBER
Hydraulics of Surface Buoyant Jet,
W77-03743 8B

RILL EROSION
Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

RIONI RIVER BASIN (USSR)
Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

RIPARIAN RIGHTS
General State Powers over Water.
W77-03703 6E

Kempf V Ellixson (Determination of Riparian Rights Where Land is Separated from Body of Water by Public Highway).
W77-03710 6E

RISKS
Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

RIVER BASIN DEVELOPMENT
Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

Multipurpose Development on the Tisza River.
W77-03957 4A

RIVER BASINS
Klamath River Basin Compact.
W77-03705 6E

Assessment of Flood Management Alternatives Against Social Performance Criteria, Phase II Report,
W77-03774 6F

Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

RIVER BEDS
Largescale Ripples of the Lower Wabash River,
W77-03761 2J

RIVER FLOW
Transverse Dispersion in Meandering Channels,
W77-03644 2E

RIVER YSTWYTH (WALES)
Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

RIVERS
Transverse Dispersion in Meandering Channels,
W77-03644 2E

Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region),
W77-03989 4A

Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

ROBERTS BAY (FLA)
Efforts in Marine Revegetation in Artificial Habitats,
W77-03949 5G

ROMANIA
Microbiological and Chemical Study of Water in the Baia de Aries Mine, (In Romanian),
W77-04077 5A

ROOTED AQUATIC PLANTS
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

ROS RIVER (USSR)
Microbiological Characteristics of the Ros/ River and Some of Its Tributaries, (In Russian),
W77-04093 5C

ROUGHNESS (HYDRAULIC)
Flow in Corrugated Pipes,
W77-03744 8B

RUNOFF
Kattor V Sabatini (No Right of Diverting Surface Water by Artificial Channel).
W77-03714 6E

Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

RUNOFF FILES
Runoff Files for Flood Hydrograph Simulation,
W77-03748 2E

RUNOFF REGULATION
Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

SALINE WATER-FRESHWATER INTERFACES
An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

SALINE WATER INTRUSION
Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

Meromictic Mechanisms in a Coastal Lake, (In Finnish),
W77-04071 5C

SALINITY
Desertification and the Salinity Problem in Australia,
W77-03741 4C

Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

Analytic Equation of State for Sea Water,
W77-03770 1B

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

A Study on the Influence of Salinity Fluctuations upon the Bacterial Flora of the Lagoon Cienaga Grade de Sante Marta (Colombia) and the Adjacent Coastal Region, (In German),
W77-04076 5B

Comparative Investigations on the Self-Purification in Polluted Waters of Different Salinities, (In German),
W77-04098 5G

SALINITY DISTRIBUTION
Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

SALINITY GRADIENTS
Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

SALINITY VARIATION
Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

SALMON
Acute Toxicity of Residual Chlorine in Wastewater to Coho Salmon (Oncorhynchus Kisutch) and Some Resultant Hematologic Changes,
W77-04027 5C

Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

SALMONELLA
A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

SALMONELLA-ANATUM
Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

SALT TOLERANCE
Acclimation and Tolerance of Artemia Salina to Copper Salts,
W77-04044 5C

SALT-VERDE WATERSHED (ARIZ)
Operational Applications of Satellite Snowcover Observations and Landsat Data Collection Systems Operations in Central Arizona,
W77-03971 2C

SALTS
Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

Acclimation and Tolerance of Artemia Salina to Copper Salts,
W77-04044 5C

SAMPLING
An Automatic, Continuous, Modular Wastewater Monitoring System,
W77-03801 5A

Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

An Oil Slick Sampling System,
W77-03909 5A

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

SAN ANTONIO BAY (TEX)
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

SAN FRANCISCO BAY-DELTA AREA (CALIF)
Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

SAND WAVES
Rollers and Ripples in Sand, Streams and Sky: Rhythmic Alteration of Transverse and Longitudinal Vortices in Three Orders,
W77-03998 2J

SANITARY ENGINEERING
Boyer V Dept of Health (Location of Leach Field Relative to Water Supply).
W77-03713 6E

SAPROPHYTIC BACTERIA
Investigations on the Influence of Salt Concentration on the Activity of Bacterial Populations from Fresh and Waste Waters, (In German),
W77-04065 5C

SATELLITES (ARTIFICIAL)
Hydrologic Aspects of Space Investigations of the Earth's Surface (Literature Survey),
W77-03848 7B

ERTS-1, A New Window on Our Planet,
W77-03875 7B

Operational Applications of Satellite Snowcover Observations and Landsat Data Collection Systems Operations in Central Arizona,
W77-03971 2C

SAVANNAH RIVER (SC)
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

SCALING
Internal Treatments for Boilers Operating Above 1200 PSI,
W77-03803 8G

Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

SCIENTIFIC PERSONNEL
Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

SCOTLAND
Control of Fjordic Deep Water Renewal by Runoff Modification,
W77-03975 2L

SEA ICE
Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

SEA LEVEL
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

SEA WATER
Analytic Equation of State for Sea Water,
W77-03770 1B

Distribution of Low-Molecular-Weight Hydrocarbons in Southern Beaufort Sea,
W77-03793 5B

Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

SEA WATER WEDGE
An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

SEAGRASS
Proceedings for Second Annual Conference on the Restoration of Coastal Vegetation in Florida.
W77-03942 5G

Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

SEALANTS
Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

SEASONAL
Space-Time Correlation Function of the Field of Evaporation from the Water Surface,
W77-03849 2D

SEASONAL VARIATIONS
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

SEDIMENT DISCHARGE
The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

SEDIMENT DISTRIBUTION
The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

Stability of Channel Beds by Amoring,
W77-03836 8B

SEDIMENT SORTING
Stability of Channel Beds by Amoring,
W77-03836 8B

SEDIMENT TRANSPORT
The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

The Role of Flocculation in the Transport of Particulate Pollutants in the Marine Environment,
W77-03646 5B

Mercury Transport by Bed Sediment Movements,
W77-03647 5B

Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

Transport and Distribution of Mercury in Sediments,
W77-03669 5B

Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

Rollers and Ripples in Sand, Streams and Sky: Rhythmic Alteration of Transverse and Longitudinal Vortices in Three Orders,
W77-03998 2J

SEDIMENTATION
The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

The Distribution and Transport of Bed Sediments and Persistent Pollutants in the Ottawa River, Canada,
W77-03645 5B

The Role of Flocculation in the Transport of Particulate Pollutants in the Marine Environment,
W77-03646 5B

Mercury Transport by Bed Sediment Movements,
W77-03647 5B

Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

SEDIMENTOLOGY
Rollers and Ripples in Sand, Streams and Sky: Rhythmic Alteration of Transverse and Longitudinal Vortices in Three Orders,
W77-03998 2J

SEDIMENTS
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

Molecular Test for Oil Pollution in Surface Sediments,
W77-04058 5B

SEDIMENTS DISTRIBUTION
Transport and Distribution of Mercury in Sediments,
W77-03669 5B

SEEPAGE
Barnes V United States (Compensation for Flowage Easement Taken Over Plaintiffs' Lands).
W77-03709 6E

Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

SEEPAGE CONTROL
Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

SEICHES
Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

SELF-PURIFICATION
Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

Investigations on the Influence of Salt Concentration on the Activity of Bacterial Populations from Fresh and Waste Waters, (In German),
W77-04065 5C

Role of Populations of Plumatella Fungosa (Pallas) (Bryozoa, Phylactolema) in the Self-Purification of a Pond and a Stream, (In French),
W77-04083 5G

Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

Comparative Investigations on the Self-Purification in Polluted Waters of Different Salinities, (In German),
W77-04098 5G

SEMIARID CLIMATES
The Consequences of Fooling Mother Nature,
W77-03738 2B

SEPARATION TECHNIQUES
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

SEQUENCING
Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

SETTLING BASINS
Tall Order in Waste Treatment,
W77-03602 5D

Modern Technique for Sediment Removal (Modern teknik for sedimentupptagning),
W77-03822 5D

SEWAGE
Study on the Purification of Sewage Water in Soils of Western Siberia, (In Russian),
W77-04090 5G

Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

Comparative Investigations on the Self-Purification in Polluted Waters of Different Salinities, (In German),
W77-04098 5G

SEWAGE DISPOSAL
Boyer V Dept of Health (Location of Leach Field Relative to Water Supply).
W77-03713 6E

Water and Sewage.
W77-03724 6E

SEWAGE EFFLUENTS
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

SEWAGE TREATMENT
Solvent and Solvency -- A Solution to Sludge Problems,
W77-03616 5D

Adsorption Biooxidation Treatment of Waste Waters to Remove Contaminants Thereform,
W77-03865 5D

Phosphorus Removal from Wastewater,
W77-03867 5D

Device for Purifying Sewage,
W77-03869 5D

Method and Apparatus for Anaerobic Fermentation,
W77-03873 5D

Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

SEWERAGE
Nestle and Pollution Control,
W77-03607 5D

SHALLOW SEAS
Mean Circulation in Shallow Seas,
W77-03753 2L

SHEAR STRESS
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

SHIPS
Marine Sanitation.
W77-03720 6E

SHORE PROTECTION
Legal Aspects of Coastal Zone Management in Escambia and Santa Rosa Counties, Florida ('Escarosa'),
W77-03697 6E

SHRIMP
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

SIBERIA
Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region),
W77-03989 4A

SILICATES
Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

SILLS
Supercritical Flow Over Sills,
W77-03747 8B

SILTATION
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

SILTING
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

SILTS
Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

SIMULATION ANALYSIS
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

A Mathematical Model for Simulating Water Quality Under Non-Steady State Conditions,
W77-03831 5B

Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

SITES
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

SKIMMING
A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

SLOPE WATER
A Study in the Slope Water Region South of Halifax,
W77-03844 2L

SLUDGE
Solidifying Sludge Containing Heavy Metals -- by Treating with Sulphur Compounds, Colloidal Sulphur and Bituminous Emulsion.
W77-03611 5D

Continuous Bowl-Type Centrifuges for the Clarification and Dehydration of Sludges from the Paper Industry (Centrifugeuses Continues A Bol Plein Pour Clarification et Deshydration des Boues Dans L'Industrie Papetiere).
W77-03613 5D

Solvent and Solvency -- A Solution to Sludge Problems,
W77-03616 5D

Preparation of Fertilizers from Effluent Sludges of Fermentation Plants (Poluchenie udobrenii iz shlamovykh otkhodov gidroliznogo proizvodstva),
W77-03810 5E

Possible uses for Fibrous Sludges from the Pulp and Paper Industry,
W77-03817 5E

SLUDGE DISPOSAL
Effect of Residues from Effluent Treatment During Solid Board Manufacture (Auswirkung von Rueckstanden aus der Abwasserreinigung bei der Vollpappenerzeugung),
W77-03819 5D

Modern Technique for Sediment Removal (Modern teknik for sedimentupptagning),
W77-03822 5D

Wet Oxidation of Clarification Sludge and Pulp Effluent by the Zimpro Process (Nassoxydation von Klaerschlamm und Zellstoffablauge mit dem Zimpro-Verfahren),
W77-03823 5D

Method of Disposing Sludges Containing Soluble Toxic Materials,
W77-03866 5E

SLUDGE TREATMENT
Solidifying Sludge Containing Heavy Metals -- by Treating with Sulphur Compounds, Colloidal Sulphur and Bituminous Emulsion.
W77-03611 5D

SLUICE GATES
Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

SNAILS
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

SNOW COVER
Operational Applications of Satellite Snowcover Observations and Landsat Data Collection Systems Operations in Central Arizona,
W77-03971 2C

Role of the Snow Cover in the Nature of Northern Landscapes and Its Physical Properties,
W77-03988 2C

SNOW SURVEYS
Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

SNOWMELT
Operational Applications of Satellite Snowcover Observations and Landsat Data Collection Systems Operations in Central Arizona,
W77-03971 2C

SOCIAL ASPECTS
Institutions and Objectives on the Water, Energy, Environment Interface,
W77-03934 6B

Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

Social Well-Being and Water Resources Planning,
W77-04013 6B

SOCIAL GOALS
Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

SOCIAL IMPACT
Assessment of Flood Management Alternatives Against Social Performance Criteria, Phase II Report,
W77-03774 6F

SOCIAL IMPACT ANALYSIS
Social Well-Being and Water Resources Planning,
W77-04013 6B

SOCIAL WELL-BEING
Social Well-Being and Water Resources Planning,
W77-04013 6B

SOCIOECONOMIC CHANGES
Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

SOFT SHELL CLAM
Uptake and Retention of Kuwait Crude Oil and its Effects on Oxygen Uptake by the Soft-Shell Clam, Mya Arenaria,
W77-04026 5C

SOIL CONDITIONERS
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

SOIL CONSISTENCY
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

SOIL EROSION
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

Alteration of Water Regulating and Protective Features of the Forest Under Influence of Forestry Measures, (In Russian),
W77-04002 4C

Intensity of Rainfall in Clermone-Ferrand, (In French),
W77-04032 2B

SOIL LOSS
The Application of HYMO to Study Areas of Southwestern Wyoming for Surface Runoff and Soil Loss Estimates,
W77-03729 4A

Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

SOIL MOISTURE
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

Effect of Moisture Content on Soil Consistency,
W77-03631 2G

Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

SOIL PHYSICAL PROPERTIES
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

SOIL PHYSICS
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

SOIL STRUCTURE
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

SOIL WATER MOVEMENT
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

SOIL-WATER-PLANT RELATIONSHIPS
Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

Segments of a Vicious Circle: Land Degradation and Water Resources,
W77-03740 4C

SOILS
Weed Control and the Environment, (In French),
W77-04041 5B

SOLVENTS
Solvent and Solvency -- A Solution to Sludge Problems,
W77-03616 5D

SOUTH CAROLINA
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

SOUTH DAKOTA
Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

SOUTHAMPTON WATER (ENGLAND)
Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

SPACE PHOTOGRAPHS
Some Problems in the Study of the Inundation of River Flood Plains by Aerospace Methods,
W77-03847 4A

SPARTINA ALTERNIFLORA
The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

SPATIAL DISTRIBUTION
Space-Time Correlation Function of the Field of Evaporation from the Water Surface,
W77-03849 2D

SPECTRAL ANALYSIS
Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

SPECTRAL BANDWIDTHS
Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

SPECTRAL FILTERS
Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

SPECTROPHOTOMETRY
Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

SPOIL BANKS
An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 1st Quarterly Report.
W77-03917 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

Efforts in Marine Revegetation in Artificial Habitats,
W77-03949 5G

SPOIL DISPOSAL
An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

SPRAYING
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

SPRINKLER IRRIGATION
Hose or Pipe for Sprinkling or Irrigation,
W77-03864 3F

SPRINKLING SYSTEMS
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

SQUIDS
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

ST. ANSTELL BAY (U.K.)
The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

ST. CLAIR RIVER (MICH)
Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

ST LAWRENCE RIVER
Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

ST LAWRENCE SEAWAY
Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

ST. VENANT EQUATIONS
Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

STABLE CHANNEL
Stability of Channel Beds by Amoring,
W77-03836 8B

STANDARDS
Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

Examination of Environmental Policies Using Production and Pollution Microparameter Distributions,
W77-03961 6G

STARRY FLOUNDER
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

STATE GOVERNMENTS
Section 208 Program Review, (Environmental Protection Agency), (Draft).
W77-03686 5D

STATISTICAL METHODS
A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
W77-03756 2B

Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

STATISTICAL MODELS
A Comparison of Modeling and Statistical Evaluation of Hydrologic Change,
W77-03800 4D

STEAMS
The Decomposition of Leaves in Two Southern California Streams,
W77-03829 5B

STEEL
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

STOCHASTIC PROCESSES
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

STONEFLIES
The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

STORM DRAINS
Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

STORM SURGE
Storm Surges in the Southern Beaufort Sea,
W77-03986 2L

Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

STORMS
Augmentation of 1968-1972 Winter Storms in New Mexico,
W77-03838 3B

Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

STRAIT OF CANSO (CANADA)
Geochemical Interaction in the Recently Industrialized Strait of Canso,
W77-03649 5B

STRAIT OF GEORGIA (CANADA)
Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

Numerical Model Studies of the Tides Between Vancouver Island and the Mainland Coast,
W77-03984 2L

STRAITS
Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

Numerical Model Studies of the Tides Between Vancouver Island and the Mainland Coast,
W77-03984 2L

STRATHCONA SOUND
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

STRATIFICATION
Mass and Salt Transfers and Halocline Depths in an Estuary,
W77-03751 2L

STREAMFLOW
The Effects of Streamflow Variation on Production and Income of Irrigated Farms Operating Under the Doctrine of Prior Appropriation,
W77-03637 3F

Ownership of Water.
W77-03722 6E

Effects of Forest Cultural Treatments Upon Streamflow,
W77-03795 4C

Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

STREAMFLOW FORECASTING
The Application of HYMO to Study Areas of Southwestern Wyoming for Surface Runoff and Soil Loss Estimates,
W77-03729 4A

STREAMS
Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

STRIP MINES
An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

SUBARCTIC
Evidence of a Westward-Flowing 'Subarctic Countercurrent' in the North Pacific Ocean,
W77-03760 2L

SUBLETHAL EFFECTS
Effects of Oil on the Amphipod Gammarus Oceanicus,
W77-03777 5C

SUBMERGED BUOYANT JETS
Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

SUBSURFACE FLOW
Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

SUCCESSION
Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

SUGAR BEETS
Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

SULFIDES
Sulphide Measurement Using Ammonium Molybdate,
W77-03657 5A

SULFITE LIQUORS
Electrochemical Purification of Effluents from the Manufacture of Sulfite and Kraft Pulps (Elektrokhimicheskaya ochistka stochnykh vod ot proizvodstva sul'fitnoi i sul'fatnoi tsellyulozy),
W77-03815 5D

Utilization of the Spent Sulfite Liquor Components in the Pekilo Protein Process and the Influence of the Process upon the Environmental Problems of a Sulfite Mill,
W77-03816 5D

SULFITE PULP MILLS
Reduction of Fresh Water Consumption at the Kondopoga Mill for the Manufacture of Pulp (Opyt raboty kondopozhnogo kombinata po cokrashcheniyu raschoda svezhei vody v tsellyuloznom proizvodstve),
W77-03790 3E

SULFUR
Solidifying Sludge Containing Heavy Metals - by Treating with Sulphur Compounds, Colloidal Sulphur and Bituminous Emulsion.
W77-03611 5D

SULFUR COMPOUNDS
Solidifying Sludge Containing Heavy Metals - by Treating with Sulphur Compounds, Colloidal Sulphur and Bituminous Emulsion.
W77-03611 5D

SUN PRAIRIE (WISC)
Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

SUNDANGRASS
Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

SUPERCRITICAL FLOW
Supercritical Flow Over Sills,
W77-03747 8B

SUPPLY CONTRACTS
Clear Lake Apartments, Inc V Clear Lake Utilities (Exclusive Right to Provide Water Not a Covenant Running With the Land).
W77-03716 6E

SURFACE ALBEDO
Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

SURFACE RUNOFF
Kattor V Sabatini (No Right of Diverting Surface Water by Artificial Channel).
W77-03714 6E

The Application of HYMO to Study Areas of Southwestern Wyoming for Surface Runoff and Soil Loss Estimates,
W77-03729 4A

Experiments with the Surface Heat and Water Budgets of the Canadian Middle North,
W77-03749 2D

SURFACE WATERS
Kattor V Sabatini (No Right of Diverting Surface Water by Artificial Channel).
W77-03714 6E

Water Availability, Quality, and use in Alaska.
W77-03883 6B

Water Resources Data for Nebraska, Water Year 1975,
W77-03885 7C

Water Resources of El Paso County, Colorado,
W77-03890 6D

Water Availability of Jefferson County, Alabama,
W77-03894 4A

Ground Water Management and Surface Water Development for Irrigation,
W77-03929 4B

SURFACTANTS
Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

SURVEYS
A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

SUSPENDED SOLIDS
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

SWEDEN
The Ways of Transport of Mercury to Fish,
W77-03675 5B

SWITZERLAND
Heavy Metal Pollutants in the Sediments of the Rhone River,
W77-03651 5B

Experiences in Closing the Water System in a Paper and Board Mill (Erfahrungen bei der Kreislaufschliessung einer Papier- und Kartonfabrik),
W77-03818 5D

SYSTEMS ANALYSIS
A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

TAMPA BAY (FLA)
The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

TASTE
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

TAXES
Levees, Drains and Ditches,
W77-03727 6E

TECHNOECOLOGY
Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

TECHNOLOGY
Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

TELEMETRY
Operational Applications of Satellite Snowcover Observations and Landsat Data Collection Systems Operations in Central Arizona,
W77-03971 2C

TEMPERATURE
Thermal Effects on Aquatic Organisms, Annotated Bibliography of the 1975 Literature.
W77-03640 5C

The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

Dynamics of Microbially Produced Fulvic Material in Aquatic Environments Relative to Different Conditions of Temperature and pH,
W77-03664 5C

Spectrum of Small-Scale Oceanic Temperature Gradients,
W77-03979 2L

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

TENNESSEE
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

TENSAS BASIN LEVEE DISTRICT (LA)
Taylor V Board of Levee Commissioners of the Tensas Basin Levee District (A Taking for Levee Purposes).
W77-03707 6E

TERRESTRIAL RADIATION
Lake Erie Terrestrial Radiation,
W77-03858 2H

TESTING PROCEDURES
The Costs and Effects of Chronic Exposure to Low-Level Pollutants in the Environment,
W77-03701 6G

TEXAS
Clear Lake Apartments, Inc V Clear Lake Utilities (Exclusive Right to Provide Water Not a Covenant Running With the Land).
W77-03716 6E

The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

TEXTILES
Evaluation of Wastewater Treatment Facilities.
W77-03619 5D

In-Plant, Outside Pollution Evils, Energy Saving Top AATCC Concerns.
W77-03620 5G

Effect of Dyes Used in the Textile Industry on the Purification of Effluents by the Activated Sludge Process (Wplyw niektorych barwnikow stosowanych w przemysle wlokienniczym na oczyszczanie sziekow osadem czynnym),
W77-03821 5D

THAMES RIVER (CONN)
An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 1st Quarterly Report.
W77-03917 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 2nd Quarterly Report.
W77-03918 5C

An Environmental Survey of Effects of Dredging and Spoil Disposal, New London, Connecticut. 3rd Quarterly Report.
W77-03919 5C

THEOREM OF COMPARATIVE ADVANTAGE
Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

THEORETICAL ANALYSIS
Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

On the Description of the Hydrographic State and the Circulation in the Baltic Deep Water,
W77-04006 2L

THERMAL ENERGY
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

THERMAL PLUME
Preoperational and Operational Hydrothermal Field Data Acquisition and Analysis,
W77-03837 5B

THERMAL POLLUTION
Thermal Effects on Aquatic Organisms, Annotated Bibliography of the 1975 Literature.
W77-03640 5C

Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

River and Cooling Water Temperature Fluctuations,
W77-03834 5B

Preoperational and Operational Hydrothermal Field Data Acquisition and Analysis,
W77-03837 5B

Coastal Marine Pollution and Fish,
W77-03902 5C

Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

THERMAL PROPERTIES
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

THERMAL STRATIFICATION
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

THERMAL STRESS
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

THERMAL WATER
A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

THUNDER BAY (ONT)
Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

TIDAL EFFECTS
A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

TIDAL MARSHES
Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

TIDAL WATERS
Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

TIDES
Tidal Currents and Estuarine-Type Circulation in Johnstone Strait, British Columbia,
W77-03846 2L

Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

TIME SERIES ANALYSIS
Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

TIMING
Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

TIN
The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

TISZA RIVER (HUNGARY)
Multipurpose Development on the Tisza River.
W77-03957 4A

TOWER BIOLOGY TREATMENT
Tall Order in Waste Treatment,
W77-03602 5D

TOXIC MECHANISMS
The Effect of Ammonia Exposure on Gill Structure of the Rainbow Trout (Salmo Gairdneri),
W77-04056 5C

TOXICITY
Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

Coastal Marine Pollution and Fish,
W77-03902 5C

Current Problems of Hygienic Standardization of New Chemical Substances, (In Russian),
W77-04015 5C

Acute Toxicity of Residual Chlorine in Wastewater to Coho Salmon (Oncorhynchus Kisutch) and Some Resultant Hematologic Changes,
W77-04027 5C

The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates,
W77-04030 5C

Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

Deleterious Effects of Corexit 9527 on Fertilization and Development,
W77-04050 5C

Toxicological Effects of Diethylnitrosamine (DENA) in Guppies (Lebistes Reticulatus), (In German),
W77-04100 5C

TOXICITY BIOASSAY
The Effect of Ammonia Exposure on Gill Structure of the Rainbow Trout (Salmo Gairdneri),
W77-04056 5C

TRACE ELEMENTS
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

Experimental and Field Studies in Hygienic Assessment of Drinking Water Containing Boron, (In Russian),
W77-04033 5G

Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

TRACE METALS
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

TRANSITION FLOW
Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

TRANSPIRATION
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

TRANSPIRING LEAF
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

TRANSPORTATION
Water Transportation Service.
W77-03725 6E

Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

TRANSPORTATION WATER POLLUTION SOURCES
Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

TRAVEL-COST METHOD
Estimating Net Benefits of Recreation Under Conditions of Excess Demand,
W77-03964 6D

TREATMENT
Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici),
W77-03603 5D

TREATMENT FACILITIES
Nestle and Pollution Control,
W77-03607 5D

Treatment of Putrefactive Meat and Fish Waste -- for Preparation of Manure, Animal Feeds and Fuel Oil,
W77-03608 5D

Evaluation of Wastewater Treatment Facilities.
W77-03619 5D

A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

TRIFLURALIN
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

TROPHIC LEVEL
Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

TUMLIRZ EQUATION
Analytic Equation of State for Sea Water,
W77-03770 1B

TUNDRA
Role of the Snow Cover in the Nature of Northern Landscapes and Its Physical Properties,
W77-03988 2C

TUNGSTEN
Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

TURBULENT FLOW
Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

TWO-AXIS METHOD
The Two-Axis Method: A New Method to Calculate Average Precipitation Over A Basin,
W77-03755 2B

ULTIMATE DISPOSAL
Method of Disposing Sludges Containing Soluble Toxic Materials,
W77-03866 5E

UNCERTAINTY
Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

UNDERGROUND WASTE DISPOSAL
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

UNITED STATES
A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

UNSATURATED FLOW
Unsaturated Zone and Vertical-Flow Components in Draining Unconfined Formations,
W77-04000 2F

UNSTEADY FLOW
Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

UPWELLING
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

URAL RIVER
Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

URBAN DRAINAGE
Least Cost Control Strategies in Urban Drainage Design -- A Dynamic Programming Approach,
W77-04007 4A

URBAN HYDROLOGY
Legal Constraints on Urban Water Systems,
W77-03692 3D

URBANIZATION
Water Resources of El Paso County, Colorado,
W77-03890 6D

UREAS
Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

USSR
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

Space-Time Correlation Function of the Field of Evaporation from the Water Surface,
W77-03849 2D

Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

Standard 'Potable Water' (All-Union State Standard 2874-73, A New Stage in the Development of Water Hygiene, (In Russian),
W77-03853 5G

Role of the Snow Cover in the Nature of Northern Landscapes and Its Physical Properties,
W77-03988 2C

Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region),
W77-03989 4A

Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters,
W77-03990 2K

Alteration of Water Regulating and Protective Features of the Forest Under Influence of Forestry Measures, (In Russian),
W77-04002 4C

Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

Study on the Purification of Sewage Water in Soils of Western Siberia, (In Russian),
W77-04090 5G

Microbiological Characteristics of the Ros/ River and Some of Its Tributaries, (In Russian),
W77-04093 5C

Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

USSR (IVANKOVO RESERVOIR)
Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

USSR (LAKE DALNEE)
Study of the Production Process of Daphnia Longiremis Sars Population from Lake Dalnee by Means of a Mathematical Model, (In Russian),
W77-04055 5C

UTAH
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

UTILITIES
Water Transportation Service.
W77-03725 6E

VALORIZATION
Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

VARDAR BASIN (YUGOSLAVIA)
Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

VARIABILITY
Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

VEGETATION
Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

VEMA CHANNEL
Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

VERMILION RIVER (ILL)
Lead Transport in a River Ecosystem,
W77-03672 5B

VERTICAL FLOW
Unsaturated Zone and Vertical-Flow Components in Draining Unconfined Formations,
W77-04000 2F

VIRGINIA
Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

VIRUSES
Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

VISCOELASTICITY
Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

VOLGA RIVER
Microbial Processes of Phenol Degradation in the Volga and its Reservoirs, (In Russian),
W77-04064 5C

Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

VOLUME
Analytic Equation of State for Sea Water,
W77-03770 1B

WABASH RIVER (ILL)
Largescale Ripples of the Lower Wabash River,
W77-03761 2J

WAHIAWA RESERVOIR (HI)
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

WALKER BRANCH (TENN)
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

WARD CREEK (CALIF)
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

WASHINGTON
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

WASTE ASSIMILATIVE CAPACITY
Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

Bacterial Assimilation of Organic Matter in Waters with Various Pollution Levels, (In Russian),
W77-04081 5B

WASTE DISPOSAL
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

BPT: Consider the Alternatives (Best Practical Treatment Criterion).
W77-03690 5D

Marine Sanitation.
W77-03720 6E

Method of Disposing Sludges Containing Soluble Toxic Materials,
W77-03866 5E

Coastal Marine Pollution and Fish,
W77-03902 5C

Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

WASTE DISPOSAL SITE SELECTION
The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

WASTE DISPOSAL WELLS
The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

WASTE DUMPS
Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

WASTE HEAT
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

WASTE STORAGE
Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

WASTE WATER DISPOSAL
BPT: Consider the Alternatives (Best Practical Treatment Criterion).
W77-03690 5D

Modeling Process Substitutions by LP and MIP,
W77-03933 5G

WASTE WATER (POLLUTION)
BPT: Consider the Alternatives (Best Practical Treatment Criterion).
W77-03690 5D

An Automatic, Continuous, Modular Wastewater Monitoring System,
W77-03801 5A

WASTE WATER TREATMENT
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

Tall Order in Waste Treatment,
W77-03602 5D

Chemical-Industry Costs of Water Pollution Abatement,
W77-03604 5D

The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

Purification of Wine Distillery Effluents (Epuration Des Effluents De Distilleries Vinicoles),
W77-03606 5D

Nestle and Pollution Control,
W77-03607 5D

Treatment of Putrefactive Meat and Fish Waste -- for Preparation of Manure, Animal Feeds and Fuel Oil,
W77-03608 5D

Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

Reverse Osmosis for the Treatment of Metal Waste Solutions,
W77-03610 5D

Continuous Bowl-Type Centrifuges for the Clarification and Dehydration of Sludges from the Paper Industry (Centrifugeuses Continues A Bol Plein Pour Clarification et Deshydration des Boues Dans L'Industrie Papetiere).
W77-03613 5D

Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

Solvent and Solvency -- A Solution to Sludge Problems,
W77-03616 5D

Purifying and Regenerating Gaseous and Fluid Phase Effluents -- Such as Ammonia Mixtures from Wool Processing, Mercerising Etc.
W77-03617 5D

Evaluation of Wastewater Treatment Facilities.
W77-03619 5D

A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

BPT: Consider the Alternatives (Best Practical Treatment Criterion).
W77-03690 5D

Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

Chlorine-Based Bleachery Effluent Treatment,
W77-03806 5D

Purification of Residual Liquor from Yeast Production (Ochistka posledrozhzhevoi brazhki),
W77-03811 5D

Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

Electrochemical Purification of Effluents from the Manufacture of Sulfite and Kraft Pulps (Elektrokhimicheskaya ochistka stochnykh vod ot proizvodstva sul'fitnoi i sul'fatnoi tsellyulozy),
W77-03815 5D

Operating Experiences with an Electrolytic Method for Purifying NSSC (Neutral Sulfite Semichemical) Effluent (Betriebserfahrungen mit einem elektrolytischen Verfahren bei der Reinigung von NSSC-Abwasser),
W77-03820 5D

Effect of Dyes Used in the Textile Industry on the Purification of Effluents by the Activated Sludge Process (Wplyw niektorych barwnikow stosowanych w przemysle wlokienniczym na oczyszczanie sziekow osadem czynnym),
W77-03821 5D

Biological Effluent Clarification in the Paper Mill Circulation System (Biologische Abwasseraufbereitung im Kreislauf einer Papierfabrik),
W77-03824 5D

Adsorption Biooxidation Treatment of Waste Waters to Remove Contaminants Thereform,
W77-03865 5D

Phosphorus Removal from Wastewater,
W77-03867 5D

Device for Purifying Sewage,
W77-03869 5D

Method and Apparatus for Anaerobic Fermentation,
W77-03873 5D

Public Choice and Urban Water Quality,
W77-03960 6B

Physical and Economic Parameters for Planning Regional Wastewater Treatment Systems,
W77-04010 5D

Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

On the Counterplan for Treatment of Foul Water Which Oozed Out from A Dumping Ground, (In Japanese),
W77-04066 5D

WASTES

Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

WATER

Water and Sewage.
W77-03724 6E

WATER ALLOCATION (POLICY)

Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

WATER ANALYSIS

On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

Identification of 1,1,1-Trichloroacetone (1,1,1-Trichloropropanone) in Two Drinking Waters: A Known Precursor in Haloform Reaction,
W77-03794 5A

Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

WATER BALANCE

Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

WATER BIRDS

Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

WATER CIRCULATION

A Numerical Investigation of the Circulation in the Norwegian Sea,
W77-03750 2L

Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

WATER CONSERVATION

Legal Constraints on Urban Water Systems,
W77-03692 3D

Reduction of Fresh Water Consumption at the Kondopoga Mill for the Manufacture of Pulp (Opyt raboty kondopozhnogo kombinata po cokrashcheniyu raschoda svezhei vody v tsellyuloznom proizvodstve),
W77-03790 3E

Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

Design of an Efficient Water System for a Kraft Pulp Mill,
W77-03804 5D

Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

Experiences in Closing the Water System in a Paper and Board Mill (Erfahrungen bei der Kreislaufschliessung einer Papier- und Kartonfabrik),
W77-03818 5D

WATER CONSUMPTION (EXCEPT CONSUMPTIVE USE)
Reduction of Fresh Water Consumption at the Kondopoga Mill for the Manufacture of Pulp (Opyt raboty kondopozhnogo kombinata po cokrashcheniyu raschoda svezhei vody v tsellyuloznom proizvodstve),
W77-03790 3E

WATER CONTRACTS
Clear Lake Apartments, Inc V Clear Lake Utilities (Exclusive Right to Provide Water Not a Covenant Running With the Land).
W77-03716 6E

WATER CONVEYANCE
Water Transportation Service.
W77-03725 6E

WATER COOLING
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

WATER DEMAND
Water Resources of El Paso County, Colorado,
W77-03890 6D

Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Estimating Net Benefits of Recreation Under Conditions of Excess Demand,
W77-03964 6D

WATER DISTRICTS
California Water Law in Perspective,
W77-03689 6E

WATER LAW
Artificial and Natural Lakes,
W77-03694 6E

Legal Aspects of Coastal Zone Management in Escambia and Santa Rosa Counties, Florida ('Escarosa'),
W77-03697 6E

WATER LEVEL FLUCTUATIONS
Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

WATER LEVELS
Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region),
W77-03989 4A

WATER LOSS
Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

WATER MANAGEMENT (APPLIED)
Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

Application of Game Theory in Water Management,
W77-04009 6A

WATER OSCILLATIONS
Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

WATER PERMITS
Boyer V Dept of Health (Location of Leach Field Relative to Water Supply).
W77-03713 6E

State Ex Rel Cox V Wolfe (Statute Prohibiting Removal of Material from Bed or Banks or Filling of Waters of State Without a Permit).
W77-03717 6E

WATER POLICY
Economic Modeling for Water Policy Evaluation.
W77-03924 6A

WATER POLLUTION
The Distribution and Transport of Bed Sediments and Persistent Pollutants in the Ottawa River, Canada,
W77-03645 5B

The Role of Flocculation in the Transport of Particulate Pollutants in the Marine Environment,
W77-03646 5B

Mercury Transport by Bed Sediment Movements,
W77-03647 5B

Heavy Metal Pollutants in the Sediments of the Rhone River,
W77-03651 5B

Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

Heavy Metals in the Lower Mississippi,
W77-03654 5B

The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

Bacterial Mobilization of Mercury in Chesapeake Bay,
W77-03670 5C

Water Pollution Control Administration, A Memorandum Report on a Reconnaissance Study.
W77-03684 5G

Deleterious Substances in Streams.
W77-03721 6E

The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

Distribution of Low-Molecular-Weight Hydrocarbons in Southern Beaufort Sea,
W77-03793 5B

Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

An Oil Slick Sampling System,
W77-03909 5A

Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

WATER POLLUTION CONTROL
Nestle and Pollution Control,
W77-03607 5D

In-Plant, Outside Pollution Evils, Energy Saving Top AATCC Concerns.
W77-03620 5G

Water Pollution Control Administration, A Memorandum Report on a Reconnaissance Study.
W77-03684 5G

Klamath River Basin Compact.
W77-03705 6E

A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

Development of Fast Current Oil Response System,
W77-03904 5G

Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

Modeling and Information Handling in Environmental Science,
W77-03926 5G

National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

Physical and Economic Parameters for Planning Regional Wastewater Treatment Systems,
W77-04010 5D

Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

WATER POLLUTION CONTROL ACT OF 1972

Damages Compensable Under Federal Maritime Law for Injuries Caused by Discharge of Oil into Navigable Waters,
W77-03711 5G

WATER POLLUTION EFFECTS

Trace Metal Pollution from a Metropolitan Area: Sources and Accumulation in the Lower Fraser River and Estuary,
W77-03652 5B

The Form of Mercury in Freshwater Fish,
W77-03673 5A

Origin and Fate of Mercury Compounds in Fish,
W77-03674 5B

The Ways of Transport of Mercury to Fish,
W77-03675 5B

Time and Space Dependence of Pollutant Levels in Aquatic Biota, Field Studies,
W77-03676 5B

Trends of PCB and DDT in Fish and Aquatic Birds,
W77-03677 5B

Mercury Effects on Swimming and Metabolism of Trout,
W77-03678 5C

The Ottawa River Project,
W77-03683 5B

The Costs and Effects of Chronic Exposure to Low-Level Pollutants in the Environment,
W77-03701 6G

Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Marine Phytoplankton Growth in High Concentrations of Pulp Mill Effluent,
W77-03798 5C

Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

Coastal Marine Pollution and Fish,
W77-03902 5C

Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

Long-Term Chemical Effects of Petroleum in South Louisiana Wetlands - 1. Organic Carbon in Sediments and Waters,
W77-04043 5C

WATER POLLUTION SOURCES

Lead Transport in a River Ecosystem,
W77-03672 5B

Hydraulics of Surface Buoyant Jet,
W77-03743 8B

Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

Ground-Water Pollution Near a Landfill,
W77-03991 5B

WATER POLLUTION TREATMENT

Contingency Plan for Spills of Oil and Hazardous Materials for Inland Waters of Region III.
W77-03700 5G

Experiences in Closing the Water System in a Paper and Board Mill (Erfahrungen bei der Kreislaufschliessung einer Papier- und Kartonfabrik),
W77-03818 5D

Device for Purifying Sewage,
W77-03869 5D

WATER PROPERTIES

Analytic Equation of State for Sea Water,
W77-03770 1B

WATER PURIFICATION

Device for Purifying Sewage,
W77-03869 5D

Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

Study on the Purification of Sewage Water in Soils of Western Siberia, (In Russian),
W77-04090 5G

WATER QUALITY

The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

Water Pollution Investigation: Detroit and St. Clair Rivers.
W77-03783 5G

Effects of Forest Cultural Treatments Upon Streamflow,
W77-03795 4C

Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

A Mathematical Model for Simulating Water Quality Under Non-Steady State Conditions,
W77-03831 5B

An Investigation into the Effects of Forestry Plantations on the Water Quality of Upland Reservoirs in Northern Ireland,
W77-03840 5B

Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

Water Availability, Quality, and use in Alaska.
W77-03883 6B

Water Resources Data for Nebraska, Water Year 1975,
W77-03885 7C

Ground-Water Resources and Geology of Jefferson County, Wisconsin,
W77-03889 4B

Water Availability of Jefferson County, Alabama,
W77-03894 4A

Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

Coastal Marine Pollution and Fish,
W77-03902 5C

Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

Preference Models of Environmental Impact,
W77-04020 6G

Demonstration of a State Water Quality Management Information System,
W77-04021 5G

Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian),
W77-04084 5G

WATER QUALITY CONTROL

Water Pollution Control Administration, A Memorandum Report on a Reconnaissance Study.
W77-03684 5G

Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

Water Quality Management and the Distribution of Emission Rights by Sealed Tender Markets,
W77-03931 5G

Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

Modeling Process Substitutions by LP and MIP,
W77-03933 5G

Application of Game Theory in Water Management,
W77-04009 6A

A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

WATER QUALITY IMPROVEMENT ACT OF 1970

Damages Compensable Under Federal Maritime Law for Injuries Caused by Discharge of Oil into Navigable Waters,
W77-03711 5G

WATER QUALITY STANDARDS

BPT: Consider the Alternatives (Best Practical Treatment Criterion).
W77-03690 5D

Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

Standard 'Potable Water' (All-Union State Standard 2874-73, A New Stage in the Development of Water Hygiene, (In Russian),
W77-03853 5G

A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

Current Problems of Hygienic Standardization of New Chemical Substances, (In Russian),
W77-04015 5C

Experimental and Field Studies in Hygienic Assessment of Drinking Water Containing Boron, (In Russian),
W77-04033 5G

Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

WATER RESOURCES

State Administration Generally (Powers and Duties of the Department of Water Resources).
W77-03704 6E

ERTS-1, A New Window on Our Planet,
W77-03875 7B

Water Resources of El Paso County, Colorado,
W77-03890 6D

Water Availability of Jefferson County, Alabama,
W77-03894 4A

Development of Fast Current Oil Response System,
W77-03904 5G

Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

Institutions and Objectives on the Water, Energy, Environment Interface,
W77-03934 6B

Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

Multilevel Incremental Dynamic Programing,
W77-03937 6A

Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

Application of Game Theory in Water Management,
W77-04009 6A

Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

The Integration of Desalination Plant with Existing Australian Water Resources,
W77-04018 3A

WATER RESOURCES CONTROL BOARDS

California Water Law in Perspective,
W77-03689 6E

WATER RESOURCES DEVELOPMENT

Legal Constraints on Urban Water Systems,
W77-03692 3D

The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

Segments of a Vicious Circle: Land Degradation and Water Resources,
W77-03740 4C

Economic Modeling for Water Policy Evaluation.
W77-03924 6A

Modeling and Information Handling in Environmental Science,
W77-03926 5G

Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

Ground Water Management and Surface Water Development for Irrigation,
W77-03929 4B

Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

Social Well-Being and Water Resources Planning,
W77-04013 6B

WATER REUSE

Reduction of Fresh Water Consumption at the Kondopoga Mill for the Manufacture of Pulp (Opyt raboty kondopozhnogo kombinata po cokrashcheniyu raschoda svezhei vody v tsellyuloznom proizvodstve),
W77-03790 3E

Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

Design of an Efficient Water System for a Kraft Pulp Mill,
W77-03804 5D

WATER RIGHTS

California Water Law in Perspective,
W77-03689 6E

General State Powers over Water.
W77-03703 6E

WATER STORAGE

Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

WATER SUPPLY

Protection of Water Supply.
W77-03719 6E

Water and Sewage.
W77-03724 6E

Ground-Water Resources and Geology of Jefferson County, Wisconsin,
W77-03889 4B

The Integration of Desalination Plant with Existing Australian Water Resources,
W77-04018 3A

WATER SUPPLY DEVELOPMENT

Legal Constraints on Urban Water Systems,
W77-03692 3D

WATER TEMPERATURE

Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

River and Cooling Water Temperature Fluctuations,
W77-03834 5B

Preoperational and Operational Hydrothermal Field Data Acquisition and Analysis,
W77-03837 5B

Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

A Study in the Slope Water Region South of Halifax,
W77-03844 2L

Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

WATER TRANSFER

Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

WATER TREATMENT

Section 208 Program Review, (Environmental Protection Agency), (Draft).
W77-03686 5D

Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

Water Treatment for Boiler Operating Pressures Above 1200 PSIG,
W77-03805 3E

Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

WATER USERS

Validity, Construction, and Application of S 5 of Reclamation Law of 1902 (43 USCS S 431),
W77-03712 6E

WATER UTILIZATION

Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

General State Powers over Water.
W77-03703 6E

Validity, Construction, and Application of S 5 of Reclamation Law of 1902 (43 USCS S 431),
W77-03712 6E

Ground-Water Resources and Geology of Jefferson County, Wisconsin,
W77-03889 4B

National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

WATER WILLOW

Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

WATER WORKS

Protection of Water Supply.
W77-03719 6E

Condemnation of Land and Water Rights.
W77-03726 6E

WATER YIELD

Preliminary Digital Model of Ground-Water Flow in the Madison Group, Poweder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

WATERFOWL

Waterfowl and Acid Precipitation in Norway, (In Danish),
W77-03841 5C

WATERSHED MANAGEMENT

A Comparison of Modeling and Statistical Evaluation of Hydrologic Change,
W77-03800 4D

Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

WATERSHEDS (BASINS)

A Comparison of Modeling and Statistical Evaluation of Hydrologic Change,
W77-03800 4D

Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

WAVES (WATER)

Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

A Method for the Automatic Measurement of Wave Frequency,
W77-03981 2L

WEIRS

Supercritical Flow Over Sills,
W77-03747 8B

WELLS

Boyer V Dept of Health (Location of Leach Field Relative to Water Supply).
W77-03713 6E

A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

WESTERN RED-CEDAR (THUJA PLICATA)

Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

WET OXIDATION

Wet Oxidation of Clarification Sludge and Pulp Effluent by the Zimpro Process (Nassoxydation von Klaerschlamm und Zellstoffablauge mit dem Zimpro-Verfahren),
W77-03823 5D

WETLANDS

Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

Legal Protection for Florida Wetlands,
W77-03696 6E

Long-Term Chemical Effects of Petroleum in South Louisiana Wetlands - 1. Organic Carbon in Sediments and Waters,
W77-04043 5C

WETTABILITY

The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

WILDLIFE

Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

WILLAMETTE RIVER BASIN (OREG)

Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

WIND EROSION (SOILS)

The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

WIND PRESSURE

Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

WIND STRESS

Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

WINDS

The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

A Method for the Automatic Measurement of Wave Frequency,
W77-03981 2L

Spectra and Coherence of Wind-Generated Internal Waves,
W77-03982 2L

WINE DISTILLERY EFFLUENTS

Purification of Wine Distillery Effluents (Epuration Des Effluents De Distilleries Vinicoles),
W77-03606 5D

WINTER

Augmentation of 1968-1972 Winter Storms in New Mexico,
W77-03838 3B

WISCONSIN
Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

Ground-Water Resources and Geology of Jefferson County, Wisconsin,
W77-03889 4B

WITHDRAWAL
Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

WOOD EXTRACTIVES
Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

WOOD INDUSTRY
Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

WYOMING
Water Resources Data System,
W77-03728 7C

The Application of HYMO to Study Areas of Southwestern Wyoming for Surface Runoff and Soil Loss Estimates,
W77-03729 4A

Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

Preliminary Digital Model of Ground-Water Flow in the Madison Group, Poweder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

X-RAY ANALYSIS
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

X-RAY FLUORESCENCE
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

XAD-2 RESIN
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

XENOBIOTICS
Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

YEASTS
Purification of Residual Liquor from Yeast Production (Ochistka posledrozhzhevoi brazhki),
W77-03811 5D

YELLOW WATER LILY
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

YUBA RIVER
State Administration Generally (Powers and Duties of the Department of Water Resources).
W77-03704 6E

YUGOSLOVIA (RIVER PIVA)
Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

ZERO DISCHARGE ALTERNATIVES
Public Choice and Urban Water Quality,
W77-03960 6B

ZINC
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

ZOOPLANKTON
Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

AUTHOR INDEX

ABDALLA, M. M.
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

ABO-ZIED, W. A.
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

ABRAHAM, G.
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

ADAMOWSKI, K.
Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

AHMED, J.
Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

AKIM, G. L.
Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

AKULOV, K. I.
Hygienic Aspects of Protection of Water Resources in the Light of the Resolution by the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers on 'Means of Preventing Pollution of the Volga and Ural River Basins by Untreated Sewage', (In Russian),
W77-04096 5G

AL-HADITHI, A. H.
Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

ALBERTS, J. J.
A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

ALBRECHT, P.
Molecular Test for Oil Pollution in Surface Sediments,
W77-04058 5B

ALBRIGHT, L. J.
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

ALEXANDER, D. G.
Mercury Effects on Swimming and Metabolism of Trout,
W77-03678 5C

ALI, M. S.
Sulphide Measurement Using Ammonium Molybdate,
W77-03657 5A

ALLAN, D. S.
Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

ALPENS, C. E.
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

ANDERSON, J. W.
Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

ANDERSON, R. D.
Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

ANDERSON, R. J.
Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

ANDERSON, R. L.
The Effects of Streamflow Variation on Production and Income of Irrigated Farms Operating Under the Doctrine of Prior Appropriation,
W77-03637 3F

ANDERSON, W. C.
Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

ARNAC, M.
Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

ARULANANDAN, K.
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

ASELL, B.
On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
W77-03680 5B

ASKEW, A. J.
Multilevel Incremental Dynamic Programing,
W77-03937 6A

ATTANASI, E. D.
Water Quality Management and the Distribution of Emission Rights by Sealed Tender Markets,
W77-03931 5G

AUSNESS, R. C.
Ownership of Submerged Lands in Florida,
W77-03695 6E

AYERS, R. R.
A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

AYOADE, J. O.
A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
W77-03756 2B

BALDING, G. O.
Water Availability, Quality, and use in Alaska.
W77-03883 6B

BALLANCE, W. C.
Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico,
W77-03878 4B

BANKE, E. G.
Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

BARAN, S.
Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

BARFIELD, B. J.
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

BARNEA, M.
Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

BARRACLOUGH, J. T.
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

BARTOLOME, J. W.
Desert Repaired in Southeastern Oregon: A Case Study in Range Management,
W77-03742 4D

BASARAN, A. K. T.
A Mathematical Model for Simulating Water Quality Under Non-Steady State Conditions,
W77-03831 5B

BAXTER, R. R.
The International Law of Scientific Research in the Oceans,
W77-03687 6E

BEARDSELL, M. F.
Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

BECKMAN, E. W.
Magnitude and Frequency of Floods in Nebraska,
W77-03886 2E

BEDINGER, M. S.
Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

BEL'CHIKOV, V. A.
Model of the Formation of Rain Floods in the Rioni River Basin and its Use for Short-Range Forecasts,
W77-03850 2E

BENDER, S. A.
Water Resources Data System,
W77-03728 7C

BENDIXEN, S.
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

BENNETT, G. D.
Introduction to Ground-Water Hydraulics--A Programed Text for Self-Instruction,
W77-03884 8B

BERGER, H. F.
Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

BERGER, W. G.
Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri),
W77-04039 5C

BESIK, F.
Adsorption Biooxidation Treatment of Waste Waters to Remove Contaminants Thereform,
W77-03865 5D

BESSOU, F.
Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

BETHLAHMY, N.
The Two-Axis Method: A New Method to Calculate Average Precipitation Over A Basin,
W77-03755 2B

BICKHAM, K. L.
A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

BINGHAM, D. L.
Water Resources of El Paso County, Colorado,
W77-03890 6D

BIRKEMEIER, W. A.
Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

BISCAYE, P. E.
Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

BISHOP, J. N.
The Form of Mercury in Freshwater Fish,
W77-03673 5A

BISHOP, W. S.
Long-Term Chemical Effects of Petroleum in South Louisiana Wetlands - 1. Organic Carbon in Sediments and Waters,
W77-04043 5C

BISTERFELD, F. T.
Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

BLACK, H. T.
A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

BLAKE, J. D.
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

BLOCK, J.
Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

BLOSSER, R. O.
A Survey of Pulp and Paper Industry Environmental Protection Expenditures and Operating Costs - 1975,
W77-03807 5D

BODO, B.
Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

BOGARDI, I.
Application of Game Theory in Water Management,
W77-04009 6A

BOGDANOV, M. V.
Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

BOHN, A.
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

BOLKE, E. L.
Chemical and Physical Data for the Flaming Gorge Reservoir Area, Utah and Wyoming, 1973-75,
W77-03881 7C

BORDAS, E.
Thyroid Modifications in Rats after Administration of Mineral Residue from Drinking Water, (In French),
W77-04089 5C

BORMAN, R. G.
Ground-Water Resources and Geology of Jefferson County, Wisconsin,
W77-03889 4B

BOURG, A. C. M.
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

BOWER, B. T.
Modeling Process Substitutions by LP and MIP,
W77-03933 5G

BRADFIELD, R. E. N.
An Assessment of the Pollution of Cornish Coastal Waters,
W77-04061 5B

BRADLEY, E.
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

BRENNER, L.
Identification of 1,1,1-Trichloroacetone (1,1,1-Trichloropropanone) in Two Drinking Waters: A Known Precursor in Haloform Reaction,
W77-03794 5A

BRETTER, E.
Thyroid Modifications in Rats after Administration of Mineral Residue from Drinking Water, (In French),
W77-04089 5C

BRINCKMAN, F. E.
The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

BRINSON, M. M.
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

BROADFOOT, R.
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

BROWN, L. R.
Social Well-Being and Water Resources Planning,
W77-04013 6B

BROWN, R. A.
Hydrocarbons in a Wilderness Lake,
W77-04048 5B

Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

BRUNSON, B. A.
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

BRUTSAERT, W.
On a Derivable Formula for Long-Wave Radiation from Clear Skies,
W77-03638 2B

Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

BUCKHOUSE, J. C.
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

BUCKLEY, J. A.
Acute Toxicity of Residual Chlorine in Wastewater to Coho Salmon (Oncorhynchus Kisutch) and Some Resultant Hematologic Changes,
W77-04027 5C

BUCKLEY, J. R.
Wind and the Surface Circulation of a Fjord,
W77-03976 2L

BULL, C. J.
Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

BURT, O. R.
Ground Water Management and Surface Water Development for Irrigation,
W77-03929 4B

Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

BUSH, B.
Identification of Gasoline Contamination of Groundwater by Gas Chromatography,
W77-03796 5A

BYSTROVA, T. A.
Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

CAIRNS, J. JR.
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

CALHOUN, W. F.
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

CALIFANO, F. L.
Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

CALLOWAY, J. A.
National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

CAMPBELL, N. J.
An Historical Sketch of Physical Oceanography in Canada,
W77-03759 2L

CAMPBELL, P. G.
Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

CAMPBELL, R.
Legal Protection for Florida Wetlands,
W77-03696 6E

CARLSON, S.
Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

CARPENTER, W. L.
Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

CASALINI, C.
Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici),
W77-03603 5D

CASE, B. E.
Origin and Fate of Mercury Compounds in Fish,
W77-03674 5B

CHAN, Y. K.
Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

CHANG, H. H.
Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

CHANG, P.
Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

CHANG, W. J.
Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

CHAPPELL, V. G. JR.
Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

CHATWIN, P. C.
Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

CHAU, A. S. Y.
Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

CHAU, V. N.
River and Cooling Water Temperature Fluctuations,
W77-03834 5B

CHERKINSKII, S. N.
Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

CHEVRAY, R.
Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

CHIBIRAITE, N. A.
Radioecological Study of Charophyta, (In Russian),
W77-04068 5C

CHILDRESS, R.
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

CHIN, P.
Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

CHRISMAN, J. JR.
Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

CHRISTIANSEN, P. B.
Internal Treatments for Boilers Operating Above 1200 PSI,
W77-03803 8G

CHUN, C.
The Cephalopoda. Part I: Oegopsida; Part II: Myopsida, Octopoda,
W77-03776 2L

CHURKINA, L. G.
Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

CHUVIL'SKAYA, N. A.
Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

CLARK, D.
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

CLARKE, R. A.
Measurements of a Small Near-Bottom Cyclonic Circulation Near the Gulf Stream Axis,
W77-03842 2L

CLAYTON, J. R. JR.
Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

CLIFF, D. D.
Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

COLEMAN, H. J.
Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

COLTHARP, G. B.
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

COLWELL, R. R.
Bacterial Mobilization of Mercury in Chesapeake Bay,
W77-03670 5C

Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

Some Effects of Petroleum on Estuarine and Marine Micro-Organisms,
W77-04063 5C

CONNOR, P. M.
The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

COOMBS, T. L.
The Kinetics of Accumulation and Excretion of Ferric Hydroxide in Mytilus Edulis (L.) and its Distribution in the Tissues,
W77-04028 5C

CORAPCIOGLU, M. Y.
Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

COSTE, B.
Role of the Mineral Nutrients Contributed by the River Rhone (France) to the Organic Production of the Waters of the Gulf of Lions, (In French),
W77-04073 5C

COSTELLA, A. C.
Marine Phytoplankton Growth in High Concentrations of Pulp Mill Effluent,
W77-03798 5C

COULTHARD, J. L.
Method and Apparatus for Anaerobic Fermentation,
W77-03873 5D

COX, B. A.
Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

CRAGIN, J. H.
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

CRAIG, G. M.
California Water Law in Perspective,
W77-03689 6E

CRANSTON, R. E.
Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

CRANSTON, R. R.
Geochemical Interaction in the Recently Industrialized Strait of Canso,
W77-03649 5B

CREAN, P. B.
Numerical Model Studies of the Tides Between Vancouver Island and the Mainland Coast,
W77-03984 2L

CREEGAN, A.
A Numerical Investigation of the Circulation in the Norwegian Sea,
W77-03750 2L

CRUFF, R. W.
Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

CSANADY, G. T.
Mean Circulation in Shallow Seas,
W77-03753 2L

Nearshore Currents Off Long Island,
W77-03754 2L

CUMMINGS-SAXTON, J.
Chemical-Industry Costs of Water Pollution Abatement,
W77-03604 5D

CUSHMAN, R. M.
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

DALRYMPLE, R. A.
Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

DARCEL, F. C.
Sulphide Measurement Using Ammonium Molybdate,
W77-03657 5A

DASTILLUNG, M.
Molecular Test for Oil Pollution in Surface Sediments,
W77-04058 5B

DAVIS, C. C.
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

DAVIS, D. R.
Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

DAVIS, G. J.
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

DAVIS, H. L.
Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

DAWSON, H. J.
Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

DE BOODT, M.
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

DE FREITAS, A. S. W.
Origin and Fate of Mercury Compounds in Fish,
W77-03674 5B

DELANY, A. C.
The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

DELL'ACQUA, R.
Identification of Gasoline Contamination of Groundwater by Gas Chromatography,
W77-03796 5A

DELORME, C. D.
Public Choice and Urban Water Quality,
W77-03960 6B

DERECKI, J. A.
Lake Erie Terrestrial Radiation,
W77-03858 2H

DETWEILER, T.
Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

DEVEZE, L.
The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

DEWEES, D. N.
The Symmetry of Effluent Charges and Subsidies for Pollution Control,
W77-03962 5G

DEXTER, R. N.
Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

DIAL, O. E. JR.
Analytic Equation of State for Sea Water,
W77-03770 1B

DICKSON, A. G.
The Distribution of Short-Chain Halogenated Aliphatic Hydrocarbons in Some Marine Organisms,
W77-04051 5C

DIXIT, D.
Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

DJORDJEVIC, B.
Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

DODOLINA, V. T.
Use of Effluents from Fermentation Plants for Field Irrigation (Ispol'zovanie stochnykh vod gidroliznykh zavodov dlya orosheniya polei),
W77-03814 5D

DONELAN, M.
A Method for the Automatic Measurement of Wave Frequency,
W77-03981 2L

DOUGLAS, I.
Desertification and the Salinity Problem in Australia,
W77-03741 4C

DREGNE, H. E.
Desertification: Symptom of a Crisis,
W77-03737 4C

DUANE, D. B.
Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

DUCKSTEIN, L.
Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

DUDLEY, N. J.
Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

DUDLEY, R. H.
A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

DUESING, F.
The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

DUFF, V. A.
Estimating Net Benefits of Recreation Under Conditions of Excess Demand,
W77-03964 6D

DUFFIELD, C.
Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

DUGAN, G. L.
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

DUMITRU, L.
Microbiological and Chemical Study of Water in the Baia de Aries Mine, (In Romanian),
W77-04077 5A

DUNSTAN, F. M.
Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

DUSHAUSKENE-DUZH, R. F.
Radioecological Study of Charophyta, (In Russian),
W77-04068 5C

DYMARCHUK, N. P.
Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

ECCLES, L. A.
Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

ECKSTEIN, G.
Irrigation Pipes with Dripper Units and Method of its Manufacture,
W77-03871 3F

ECLAVEA, R. P.
Validity, Construction, and Application of S 5 of Reclamation Law of 1902 (43 USCS S 431),
W77-03712 6E

EDELSTEN, D. J.
Control of Fjordic Deep Water Renewal by Runoff Modification,
W77-03975 2L

EDGE, B. L.
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

EDWARDS, A.
Control of Fjordic Deep Water Renewal by Runoff Modification,
W77-03975 2L

EGAN, J.
Identification of Gasoline Contamination of Groundwater by Gas Chromatography,
W77-03796 5A

EGANHOUSE, R. P.
Mercury in Tissues of Mussel Off Southern California,
W77-04060 5C

EGGERS, D. E.
The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

ELDER, J. F.
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

ELLIOTT, J. A.
Spectrum of Small-Scale Oceanic Temperature Gradients,
W77-03979 2L

ELLIOTT, W. P.
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

ELLIS, R. JR.
Reaction Products of Polyphosphates and Orthophosphates with Soils and Influence on Uptake of Phosphorus by Plants,
W77-03636 3F

ELWOOD, J. W.
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

ENGELUND, F.
Hydraulics of Surface Buoyant Jet,
W77-03743 8B

ENGLANDE, A. J. JR.
Transport and Distribution of Mercury in Sediments,
W77-03669 5B

ERGASHEV, S. E.
Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters,
W77-03990 2K

ERLENKOTTER, D.
Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

EVANS, G.
A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

FAGERSTROM, T.
On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
W77-03680 5B

FEHRING, W. K.
Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

FEINGOLD, H.
Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

FENCHEL, U.
Wet Oxidation of Clarification Sludge and Pulp Effluent by the Zimpro Process (Nassoxydation von Klaerschlamm und Zellstoffablauge mit dem Zimpro-Verfahren),
W77-03823 5D

FERRERO, E. P.
Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

FILBY, R. H.
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

FINGER, S.
Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

FIORAMONTI, J. M.
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

FISCHER, J.
Operating Experiences with an Electrolytic Method for Purifying NSSC (Neutral Sulfite Semichemical) Effluent (Betriebserfahrungen mit einem elektrolytischen Verfahren bei der Reinigung von NSSC-Abwasser),
W77-03820 5D

FISHER, F. H.
Analytic Equation of State for Sea Water,
W77-03770 1B

FISHER, W. S.
Relationships of Epibiotic Fouling and Mortalities of Eggs of the Dungeness Crab (Cancer Magister),
W77-04040 5C

FITCHKO, J.
Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

FLAKE, R. H.
Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

FLEMER, D. A.
Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

FLEPS, W.
A New Laboratory Device for Waste Water Analyses (Respirometer). Part II. Measurements with Batch Operation (UJ Laboratoriumi Szennyvisvizsgalo Keszulek (Respirometer) II. Resz. Meresek Szakaszos Uzemmod Mellett),
W77-03621 5A

FLETCHER, K.
Trace Metal Pollution from a Metropolitan Area: Sources and Accumulation in the Lower Fraser River and Estuary,
W77-03652 5B

FOGEL, M. M.
Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

FOKIN, P. S.
Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

FOLK, R. L.
Rollers and Ripples in Sand, Streams and Sky: Rhythmic Alteration of Transverse and Longitudinal Vortices in Three Orders,
W77-03998 2J

FONG, W. C.
Uptake and Retention of Kuwait Crude Oil and its Effects on Oxygen Uptake by the Soft-Shell Clam, Mya Arenaria,
W77-04026 5C

FORET, J. P.
Study on the Long-Term Effects of Some Detergents on the Sequence of Development of the Sedentary Polychaete, Capitella Capitata (Fabricius), (In French),
W77-04067 5C

FORSS, K.
Utilization of the Spent Sulfite Liquor Components in the Pekilo Protein Process and the Influence of the Process upon the Environmental Problems of a Sulfite Mill,
W77-03816 5D

FORSTER, R. L.
Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

FORTIER, S. H.
An Oil Slick Sampling System,
W77-03909 5A

FOSTER, D. H.
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

FRASER, J.
A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

FREEMAN, N. G.
Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

FREMONT, H. A.
Chlorine-Based Bleachery Effluent Treatment,
W77-03806 5D

FREUDENTHAL, P. B.
Ground-Water Levels in Wyoming, 1975,
W77-03888 4B

FROISE, S.
Least Cost Control Strategies in Urban Drainage Design -- A Dynamic Programming Approach,
W77-04007 4A

FRUH, E. G.
Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

FUGE, R.
Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

FURSENKO, M. V.
Bacterial Assimilation of Organic Matter in Waters with Various Pollution Levels, (In Russian),
W77-04081 5B

GALLAGHER, R. H.
Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

GAMBLE, D. S.
Dynamics of Interaction of Cations and Fulvic Acid,
W77-03662 2K

GARASEVICH, I. G.
Effect of Various Factors on Glucose Decomposition Rate in Natural Waters, (In Russian),
W77-03862 5C

GARELIK, I. S.
Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

GARTEN, D.
Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

GATIEN, M. G.
A Study in the Slope Water Region South of Halifax,
W77-03844 2L

GELLMAN, I.
Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

GEORGE, S. G.
The Kinetics of Accumulation and Excretion of Ferric Hydroxide in Mytilus Edulis (L.) and its Distribution in the Tissues,
W77-04028 5C

GIBSON, C. E.
An Investigation into the Effects of Forestry Plantations on the Water Quality of Upland Reservoirs in Northern Ireland,
W77-03840 5B

GILES, M. A.
Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

GILL, M. A.
Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

GILLARD, D. J.
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

GINZO, H. D.
Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

GIPP, E. K.
Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

GLADNEY, E. S.
Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

GLASS, W. R.
Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

GLENNIE, K. W.
A Reconnaissance of the Recent Sediments of the Ranns of Kutch, India,
W77-03762 2L

GLUSHCHENKO, N. V.
Preparation of Fertilizers from Effluent Sludges of Fermentation Plants (Poluchenie udobrenii iz shlamovykh otkhodov gidroliznogo proizvodstva),
W77-03810 5E

Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

GNIESER, J.
Biological Effluent Clarification in the Paper Mill Circulation System (Biologische Abwasseraufbereitung im Kreislauf einer Papierfabrik),
W77-03824 5D

GOCKE, K.
Investigations on the Influence of Salt Concentration on the Activity of Bacterial Populations from Fresh and Waste Waters, (In German),
W77-04065 5C

GOLDGRABEN, G. R.
An Automatic, Continuous, Modular Wastewater Monitoring System,
W77-03801 5A

GOLDMAN, C. R.
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

GORSLINE, D. S.
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

GOTHBERG, A.
The Ways of Transport of Mercury to Fish,
W77-03675 5B

GOWDA, T. P. H.
Physical Exchange in Stream Ecology Studies,
W77-03648 2J

GRANT, R. S.
Waste-Assimilation Study of Koshkonong Creek Below Sewage-Treatment Plant at Sun Prairie, Wisconsin,
W77-03876 5B

GRAZE, H. R.
Flow in Corrugated Pipes,
W77-03744 8B

GREEN, R.
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

GREIG, R. A.
Distribution and Abundance of Heavy Metals in Finfish, Invertebrates and Sediments Collected at a Deep Water Disposal Site,
W77-04046 5B

GRENNEY, W. J.
Physical and Economic Parameters for Planning Regional Wastewater Treatment Systems,
W77-04010 5D

GRIFFIN, W. L.
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

GRIGG, N. S.
Legal Constraints on Urban Water Systems,
W77-03692 3D

GRIM, S.
The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

GRIMSHAW, D. L.
Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

GRINBERT, A. M.
Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

GROU, E.
Microbiological and Chemical Study of Water in the Baia de Aries Mine, (In Romanian),
W77-04077 5A

GRUZDIS, V. A.
Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

HABDIJA, I.
Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

HAESSELBARTH, U.
Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

HAGEN, E.
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

HAGSTROM, B. E.
Deleterious Effects of Corexit 9527 on Fertilization and Development,
W77-04050 5C

HALL, K. J.
Trace Metal Pollution from a Metropolitan Area: Sources and Accumulation in the Lower Fraser River and Estuary,
W77-03652 5B

HAMBLIN, P. F.
Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

HANNAN, J.
Aspects of Red Mangrove Reforestation in Florida,
W77-03950 5G

HANSEN, L. G.
Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

HARDER, L.
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

HARDT, W. F.
Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

HARGRAVE, B. T.
Adsorption of C14-DDT to Particle Surfaces,
W77-03658 5B

HARLAND, J. R.
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

HARLAUT, A.
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

HARLEMAN, D. R. F.
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

HARRIS, G. H.
Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

HART, S. D.
The Decomposition of Leaves in Two Southern California Streams,
W77-03829 5B

HARTMANN, R.
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

HARTUNG, R.
Heavy Metals in the Lower Mississippi,
W77-03654 5B

HARTWIG, E.
On the Fauna of a Freshwater Flat in the Elbe Estuary (Germany), (In German),
W77-04087 5C

HASSELROT, T. B.
The Ways of Transport of Mercury to Fish,
W77-03675 5B

HEADY, E. O.
Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

HEADY, H. F.
Desert Repaired in Southeastern Oregon: A Case Study in Range Management,
W77-03742 4D

HEAPS, N. S.
Storm Surges in the Southern Beaufort Sea,
W77-03986 2L

HEIMAN, D. R.
The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

HEINLE, D. R.
Effects of Waste Water on Estuarine Ecosystems,
W77-03914 5C

HEITZ, L. F. JR.
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

HEKIMIAN, K. K.
A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

HELBIG, J. A.
Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

HENRY, R. F.
Storm Surges in the Southern Beaufort Sea,
W77-03986 2L

HENSICK, M. T.
Analysis of the National Flood Insurance Act,
W77-03693 6E

HEPPLESTON, P. B.
Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

HERRON, M. M.
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

HILDEBRAND, S. G.
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

HILER, E. A.
Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

HILL, H. J. JR.
Isolation and Characterization of Drought Tolerance in a Grain Sorghum (Sorghum Bicolor (L) Moench) Randommating Population,
W77-03623 2I

HILL, J. C.
Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

HIXON, R.
Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

HOCHMAN, E.
Examination of Environmental Policies Using Production and Pollution Microparameter Distributions,
W77-03961 6G

HODSON, P. V.
Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

HOEFS, C. R.
Internal Treatments for Boilers Operating Above 1200 PSI,
W77-03803 8G

HOLCOMBE, G. W.
Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout:

HOLCOMBE, G. W.

Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

HORNER, R.
Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

HORTIN, G. L.
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

HOULIHAN, T. M.
Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

HRUTFIORD, B. F.
Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

HUANG, J. C.
Water-Sediment Distribution of Chlorinated Hydrocarbon Pesticides in Various Environmental Conditions,
W77-03660 5B

HUEY, C.
The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

HUNG, C. S.
Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

HUNT, E. P.
Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

HUTCHINSON, T. C.
Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

IDSO, S. B.
Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

ISHMAEL, J.
Long-Term Chemical Effects of Petroleum in South Louisiana Wetlands - 1. Organic Carbon in Sediments and Waters,
W77-04043 5C

IVANOVA, R. G.
Preparation of Fertilizers from Effluent Sludges of Fermentation Plants (Poluchenie udobrenii iz shlamovykh otkhodov gidroliznogo proizvodstva),
W77-03810 5E

IVERSON, A. A.
A Scheme for Effective Control of Effluent pH,
W77-03802 5D

IVERSON, W. P.
The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

JACKSON, R. G. II.
Largescale Ripples of the Lower Wabash River,
W77-03761 2J

JADAMEC, J. R.
An Oil Slick Sampling System,
W77-03909 5A

JAMES, L. D.
Runoff Files for Flood Hydrograph Simulation,
W77-03748 2E

JANSON, L-E.
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

JANZER, V. J.
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

JELINEK, H.
On the Fauna of a Freshwater Flat in the Elbe Estuary (Germany), (In German),
W77-04087 5C

JESKE, R.
A Study on the Influence of Salinity Fluctuations upon the Bacterial Flora of the Lagoon Cienaga Grade de Sante Marta (Colombia) and the Adjacent Coastal Region, (In German),
W77-04076 5B

JIRKA, G. H.
An Assessment of Techniques for Hydrothermal Prediction,
W77-03768 5B

JOB, P.
Role of Populations of Plumatella Fungosa (Pallas) (Bryozoa, Phylactolema) in the Self-Purification of a Pond and a Stream, (In French),
W77-04083 5G

JOHNSON, B. T.
Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

JOHNSON, D. A.
Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

JOHNSON, L. J.
Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

JOHNSTON, L. M.
Heavy Metal Pollutants in the Sediments of the Rhone River,
W77-03651 5B

JURGENS, W.
Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

KABAI, D.
Hose or Pipe for Sprinkling or Irrigation,
W77-03864 3F

KACHAN, V. I.
Effect of Various Factors on Glucose Decomposition Rate in Natural Waters, (In Russian),
W77-03862 5C

Microbiological Characteristics of the Ros/ River and Some of Its Tributaries, (In Russian),
W77-04093 5C

KAISER, K. L. E.
Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

KALINICHENKO, R. A.
Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

KAMANNAVAR, H. K.
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

KANDIL, M. F.
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

KARKI, K. S.
Supercritical Flow Over Sills,
W77-03747 8B

KASE, R. H.
Spectra and Coherence of Wind-Generated Internal Waves,
W77-03982 2L

KATAKAI, N.
Device for Purifying Sewage,
W77-03869 5D

KATZ, P. L.
Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

KAWASHIMA, Y.
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

KAZAKEVICH, O. V.
Purification of Residual Liquor from Yeast Production (Ochistka posledrozhzhevoi brazhki),
W77-03811 5D

KEEFER, T. N.
Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

KEENEY, R. L.
Preference Models of Environmental Impact,
W77-04020 6G

KEINATH, T. M.
Design and Operational Criteria for Thickening of Biological Sludges,
W77-03734 5D

KELLY, W. E.
Ground-Water Pollution Near a Landfill,
W77-03991 5B

KEMENY, L. G.
The Integration of Desalination Plant with Existing Australian Water Resources,
W77-04018 3A

KENAGA, E. E.
Partitioning and Uptake of Pesticides in Biological Systems,
W77-03659 5C

KENNEDY, J. F.
Theoretical Model of River Ice Jams,
W77-03745 2C

KENNEDY, V. S.
Arsenic Concentrations in Some Coexisting Marine Organisms from Newfoundland and Labrador,
W77-04036 5C

KERR, J. P.
Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

KEYES, C. G. JR.
Augmentation of 1968-1972 Winter Storms in New Mexico,
W77-03838 3B

KHAN, S. I.
Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

KHODAKOV, V. G.
Role of the Snow Cover in the Nature of Northern Landscapes and Its Physical Properties,
W77-03988 2C

KIKUCHI, T.
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

KIMBALL, M. C.
Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

KIMURA, M.
Device for Purifying Sewage,
W77-03869 5D

KINCH, J. C.
Efforts in Marine Revegetation in Artificial Habitats,
W77-03949 5G

KINGBURY, R. W. S. M.
An Assessment of the Pollution of Cornish Coastal Waters,
W77-04061 5B

KLEIN, J. M.
Abatement of Nitrate Pollution in a Public-Supply Well by Analysis of Hydrologic Characteristics,
W77-03879 5G

Water Resources of El Paso County, Colorado,
W77-03890 6D

KLEMETSON, S. L.
Physical and Economic Parameters for Planning Regional Wastewater Treatment Systems,
W77-04010 5D

KLOSTERKOETTER, W.
Studies on the Recurrence of Bacterial Flora in Drinking Water After Ozonization, (In German),
W77-04074 5F

KLOUDA, G. A.
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

KNIGHT, A. L.
Water Availability of Jefferson County, Alabama,
W77-03894 4A

KNIGHT, A. W.
The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

KOMURA, S.
Hydraulics of Slope Erosion by Overland Flow,
W77-03994 2J

KONIKOW, L. F.
Preliminary Digital Model of Ground-Water Flow in the Madison Group, Poweder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

KONNO, S. K.
Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

KOROLEV, A. A.
Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

KOROSTELEVA, E. A.
Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

KORYAKOVA, M. D.
Concentration of Polyvalent Metals by Seaweeds in Vostok Bay, Sea of Japan,
W77-04023 5C

KOSTIKOVA, L. E.
Primary Production of Green Filamentous Algae from the Kiev Reservoir, (In Russian),
W77-04070 5C

KOVALEVA, G. I.
The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates,
W77-04030 5C

KOVBA, V. A.
Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

KRAEV, L. N.
Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

KRAMBECK, J.
The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

KRANCK, K.
The Role of Flocculation in the Transport of Particulate Pollutants in the Marine Environment,
W77-03646 5B

KREAMER, D. K.
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

KRENKE, A. N.
Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

KRENKEL, P. A.
Transport and Distribution of Mercury in Sediments,
W77-03669 5B

KRICKENBERGER, K. R.
Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

KRINSLEY, D. H.
The Production and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

KRISHNAPPAN, B. G.
Transverse Dispersion in Meandering Channels,
W77-03644 2E

KRUGLOVA, V. M.
Change of Biocenoses in Artificial Bodies of Water Due to Human Intervention, (In Russian),
W77-03618 5C

KRUNCHAK, M. M.
Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

KRZYS, R. M.
Acclimation and Tolerance of Artemia Salina to Copper Salts,
W77-04044 5C

KRZYZ, R. M.
Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

KU, H. F. H.
Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

KUDO, A.
Interaction Between Aquatic Plants and River Bed Sediments in the Uptake of Mercury from Flowing Water,
W77-03671 5C

KUDO, A.

Mercury Transport by Bed Sediment Movements,
W77-03647 5B

KUDRYAVTSEV, G. S.
Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

KUNIN, R.
The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

KUPRIYANOV, V. V.
Hydrologic Aspects of Space Investigations of the Earth's Surface (Literature Survey),
W77-03848 7B

KUSHNER, D. J.
Microbial Dealings with Heavy Metals,
W77-03666 5C

KUZ'MIN, V. A.
Preparation of Fertilizers from Effluent Sludges of Fermentation Plants (Poluchenie udobrenii iz shlamovykh otkhodov gidroliznogo proizvodstva),
W77-03810 5E

KUZ'MINA, M. A.
Preparation of Fertilizers from Effluent Sludges of Fermentation Plants (Poluchenie udobrenii iz shlamovykh otkhodov gidroliznogo proizvodstva),
W77-03810 5E

KUZICHKIN, A. P.
Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

LACEWELL, R. D.
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

LAKE, R. A.
A Canadian Arctic Fjord with Some Comparisons to Fjords of the Western Americas,
W77-03977 2L

LAMBINA, V. A.
Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

LANGER, R.
Water Disinfection by Means of Chlorine: Killing of Aggregate Bacteria, (In German),
W77-04075 5F

LANGFORD, C. H.
Dynamics of Interaction of Cations and Fulvic Acid,
W77-03662 2K

LANGFORD, K. J.
A Comparison of Modeling and Statistical Evaluation of Hydrologic Change,
W77-03800 4D

LANGWAY, C. C. JR
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

LAPOINTE, R.
Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

LAU, L.
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

LAU, L. S.
Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

LAU, Y. L.
Transverse Dispersion in Meandering Channels,
W77-03644 2E

LAW, A. G.
A Water Resources Data Management System for South Carolina,
W77-03733 7C

LAZAR, I.
Microbiological and Chemical Study of Water in the Baia de Aries Mine, (In Romanian),
W77-04077 5A

LE PETIT, J.
The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

LEBIEDOWSKI, M.
Effect of Dyes Used in the Textile Industry on the Purification of Effluents by the Activated Sludge Process (Wplyw niektorych barwnikow stosowanych w przemysle wlokienniczym na oczyszczanie sziekow osadem czynnym),
W77-03821 5D

LECHNER, J. F.
Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

LEDOVA, L. A.
Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

LEE, B. D.
Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

LEE, H. H.
Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

LEE, T. Y.
Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

LEGNER, M.
Concentration of Organic Substances in Water as a Factor Controlling the Occurrence of Some Ciliate Species,
W77-03839 5C

LELAND, H. V.
Lead Transport in a River Ecosystem,
W77-03672 5B

LEMESHKINA, E. M.
Study on the Purification of Sewage Water in Soils of Western Siberia, (In Russian),
W77-04090 5G

LEONARDI, G.
Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian),
W77-04084 5G

LEPEAU, M.
Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

LEVY, E. M.
High Seas Oil Pollution: Particulate Petroleum Residues in the North Atlantic,
W77-04025 5B

LEWIN, J.
Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

LEWIS, L. A.
Environmental Protection in Mexico and Canada,
W77-03698 6E

LEWIS, R. R.
Patterns of Secondary Succession in a Mangrove Community, Tampa Bay, Florida,
W77-03947 5G

The Possible Role of Spartina Alterniflora Loisel in Establishment of Mangroves in Florida,
W77-03948 5G

LIGGETT, J. A.
Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

LIMON, L.
Water Treatment for Boiler Operating Pressures Above 1200 PSIG,
W77-03805 3E

LINDEN, O.
Effects of Oil on the Amphipod Gammarus Oceanicus,
W77-03777 5C

LINDENMUTH, W. T.
Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

LINDHOLM, T.
Meromictic Mechanisms in a Coastal Lake, (In Finnish),
W77-04071 5C

LITSKY, W.
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

LITTLE, W. C.
Stability of Channel Beds by Amoring,
W77-03836 8B

LIU, S-L.
Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

LIVINGSTON, R. K.
Water Resources of El Paso County, Colorado, W77-03890 6D

LOEWER, O. J.
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments, W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics, W77-03758 2D

LOF, G. O. G.
Modeling Process Substitutions by LP and MIP, W77-03933 5G

LONDON, J. B.
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina, W77-03735 6B

LONG, R. R.
Mass and Salt Transfers and Halocline Depths in an Estuary, W77-03751 2L

LONNING, S.
Deleterious Effects of Corexit 9527 on Fertilization and Development, W77-04050 5C

LUDLOW, M. M.
Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume, W77-03630 2I

LUISA, P. C.
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina, W77-03735 6B

LUMB, A. M.
Runoff Files for Flood Hydrograph Simulation, W77-03748 2E

LUND, H. M. K.
Waterfowl and Acid Precipitation in Norway, (In Danish), W77-03841 5C

LUNDE, J. S.
Design of an Efficient Water System for a Kraft Pulp Mill, W77-03804 5D

LUSBY, G. C.
An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation, W77-03892 5B

MACDONALD, R. W.
Distribution of Low-Molecular-Weight Hydrocarbons in Southern Beaufort Sea, W77-03793 5B

MACK, R.
Assessment of Flood Management Alternatives Against Social Performance Criteria, Phase II Report, W77-03774 6F

MACKAY, D.
Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction, W77-03781 5A

MAGEE, W. T.
Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri), W77-04039 5C

MAKEVNINA, M. G.
Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian), W77-04097 5C

MALIK, L. K.
Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region), W77-03989 4A

MALYUTIN, M. M.
Use of Effluents from Fermentation Plants for Field Irrigation (Ispol'zovanie stochnykh vod gidroliznykh zavodov dlya orosheniya polei), W77-03814 5D

MAMZELEV, S. D.
Reduction of Fresh Water Consumption at the Kondopoga Mill for the Manufacture of Pulp (Opyt raboty kondopozhnogo kombinata po cokrashcheniyu raschoda svezhei vody v tsellyuloznom proizvodstve), W77-03790 3E

MANDAL, A.
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa, W77-03667 5C

MANKTIN, YU. A.
Space-Time Correlation Function of the Field of Evaporation from the Water Surface, W77-03849 2D

MARANS, N. S.
Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds, W77-03872 3A

MARCHYULENENE, D. P.
Radioecological Study of Charophyta, (In Russian), W77-04068 5C

MARKOFSKY, M.
Preoperational and Operational Hydrothermal Field Data Acquisition and Analysis, W77-03837 5B

MARRARO, S.
Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian), W77-04084 5G

MASADA, Y.
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese), W77-04078 5A

MASCELLANI, G.
Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici), W77-03603 5D

MASMANIDI, N. D.
The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates, W77-04030 5C

MATHEKE, G. E. M.
Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska, W77-03782 5C

MATHYS, G.
Weed Control and the Environment, (In French), W77-04041 5B

MATLOCK, W. G.
Segments of a Vicious Circle: Land Degradation and Water Resources, W77-03740 4C

MATONICKIN, I.
Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian), W77-03852 5B

MATORIN, D. N.
Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian), W77-04097 5C

MATTICK, R.
Ground-Water Resources of the Holloman Air Force Base Well-Field Area, 1967, New Mexico, W77-03878 4B

MAVLYANOV, G. A.
Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters, W77-03990 2K

MAYER, P. G.
Stability of Channel Beds by Amoring, W77-03836 8B

MCCAIN, B. B.
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington, W77-04038 5C

MCCHESNEY, S. W.
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand, W77-03731 5B

MCCONNELL, K. E.
Estimating Net Benefits of Recreation Under Conditions of Excess Demand, W77-03964 6D

MCDOWELL, S. E.
Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel, W77-04004 2L

MCELROY, R. O.
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island, W77-04057 5C

MCGINNISS, M. J.
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure, W77-04024 5C

MCGUINNESS, J. L.
A Comparison of Modeling and Statistical Evaluation of Hydrologic Change,
W77-03800 4D

MCKAY, W. C.
Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

MCKEAN, W. T.
Characteristics of Effluents from Conventional and Oxygen Bleaching Sequences,
W77-03614 5A

MCKIM, J. M.
Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

MCNAUGHTON, K. G.
Evaporation and Advection I: Evaporation from Extensive Homogeneous Surfaces,
W77-03859 2D

MCNURNEY, J. M.
Lead Transport in a River Ecosystem,
W77-03672 5B

MECHALAS, B. J.
A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

MEGAHAN, W. F.
Effects of Forest Cultural Treatments Upon Streamflow,
W77-03795 4C

MEIER, H.
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

MEL'NIKOVA, A. N.
Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

METZ, J. R.
Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

MEYER, S.
Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

MICHELINI, V.
Treatment of Troublesome Odors from the Fermentation of Antibiotics (Abbattimento Di Odori Molesti Provenienti Dalla Fermentazione Di Antibiotici),
W77-03603 5D

MILLER, B. S.
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

MILLER, D. R.
Computer Modeling,
W77-03679 5B

Mercury Transport by Bed Sediment Movements,
W77-03647 5B

The Ottawa River Project,
W77-03683 5B

MIMURA, T.
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

MIRZOEV, G. G.
Some Problems of Sanitary Microbiology, (In Russian),
W77-04085 5A

MIYAGI, T.
Device for Purifying Sewage,
W77-03869 5D

MIYATA, T.
Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

MODEL, P. L.
Experiences in Closing the Water System in a Paper and Board Mill (Erfahrungen bei der Kreislaufschliessung einer Papier- und Kartonfabrik),
W77-03818 5D

MOLODTSOV, N. K.
Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

MOORE, C. V.
Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

MORASKI, D.
Solvent and Solvency -- A Solution to Sludge Problems,
W77-03616 5D

MORGELI, B.
Biological Effluent Clarification in the Paper Mill Circulation System (Biologische Abwasseraufbereitung im Kreislauf einer Papierfabrik),
W77-03824 5D

MORIWAKI, Y.
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

MOROZOV, M. F.
Aerated Ponds for Final Purification of Wood Chemical Plant Effluents (Aeriruemye prudy dlya doochistki stokob lesokhimicheskikh predpriyatii),
W77-03813 5D

MORTIMER, D. C.
Interaction Between Aquatic Plants and River Bed Sediments in the Uptake of Mercury from Flowing Water,
W77-03671 5C

MOSTAFA, M. G.
Flow at Grade-Break from Mild to Steep Slopes,
W77-03746 8B

MOWER, R. W.
Seepage Study of Canals in Beaver Valley, Beaver County, Utah,
W77-03880 4A

MOYER, J. E.
Port Collection and Separation Facilities for Oily Wastes. Vol VI. Impact of Offshore Terminals on Contiguous Ports,
W77-03923 5G

MULLINEUX, N.
Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

MURTY, T. S.
Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

MYSAK, L. A.
Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

NABIVANETS, B. I.
Effect of Various Factors on Glucose Decomposition Rate in Natural Waters, (In Russian),
W77-03862 5C

NACHINKIN, O. I.
Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

NAGARAJA, S. H.
An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

NAKAYAMA, F. S.
Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

NANJAPPA, G.
Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

NARITA, M.
Device for Purifying Sewage,
W77-03869 5D

NARYMSKAYA, R. A.
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

NATSUME, H.
Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

NEARY, B. P.
The Form of Mercury in Freshwater Fish,
W77-03673 5A

NEEDLER, G. T.
Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

NEFF, J. M.
Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

NELSON, J. D. JR.
Bacterial Mobilization of Mercury in Chesapeake Bay,
W77-03670 5C

NELSON, T. A.
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

NETZELL, E. S.
Method and an Apparatus for Collecting Substances and Objects on a Liquid Surface,
W77-03868 5G

NEU, H. J. A.
Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

NEUMANN, D. A.
Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

NG, T. T.
Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

NICHOLS, J. P.
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

NICOL, K. J.
Models of Agricultural Water, Land use and the Environment,
W77-03927 6A

NICOLETTI, G.
Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian),
W77-04084 5G

NIELSEN, D. R.
Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

NIETER, W. M.
The Productica and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

NIHOUL, J. C. J.
Applied Mathematical Modelling in Marine Science,
W77-04008 2L

NIKITIN, Y. V.
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

NILSSON, L.
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

NOPMONGCOL, P.
Multilevel Incremental Dynamic Programing,
W77-03937 6A

NORTON, D. J.
The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

NOVIKOV, S. M.
Current Problems of Hygienic Standardization of New Chemical Substances, (In Russian),
W77-04015 5C

NOVIKOV, Y. V.
Standard 'Potable Water' (All-Union State Standard 2874-73, A New Stage in the Development of Water Hygiene, (In Russian),
W77-03853 5G

O'CONNOR, D. M.
Legal Aspects of Coastal Zone Management in Escambia and Santa Rosa Counties, Florida ('Escarosa'),
W77-03697 6E

O'CONNOR, J. M.
Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

OAKEY, N. S.
Spectrum of Small-Scale Oceanic Temperature Gradients,
W77-03979 2L

OBRIGEWITSCH, R. P.
Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

OCHISI, S.
A Scheme for Effective Control of Effluent pH,
W77-03802 5D

OGATA, M.
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

OGURA, T.
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

OHLHORST, C. W.
Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-A and Suspended Solids in the Patuxent River,
W77-03785 5A

OKAMOTO, T.
On the Counterplan for Treatment of Foul Water Which Oozed Out from A Dumping Ground, (In Japanese),
W77-04066 5D

OLIVER, B. G.
Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

OLOFFS, P. C.
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

OLSON, G. F.
Long-Term Effects of Methylmercuric Chloride on Three Generations of Brook Trout: Toxicity Accumulation, Distribution and Elimination,
W77-04031 5C

OLSSON, M.
Time and Space Dependence of Pollutant Levels in Aquatic Biota, Field Studies,
W77-03676 5B

OOSTERVELD, M.
Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

OPOLCHENNYI, O. P.
Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

OPRICOVIC, S.
Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
W77-03938 6A

ORBACH, S.
Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

ORLOB, G. T.
Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

ORVIG, S.
Experiments with the Surface Heat and Water Budgets of the Canadian Middle North,
W77-03749 2D

OSBORN, K. E.
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

OTA, R.
Water Pollution of the Rivers Flowing Eastwards into the Bay of Ise, (In Japanese),
W77-04080 5B

OVERBECK, J.
The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

OWENS, J. W.
Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

PANIKAR, J. T.
Time of Ponding--Comparison of Results of the Parlange Solution with the Smith and Mein-Larson Models,
W77-03855 2G

PASSINEN, K.
Utilization of the Spent Sulfite Liquor Components in the Pekilo Protein Process and the Influence of the Process upon the Environmental Problems of a Sulfite Mill,
W77-03816 5D

PASTERNAK, K.
Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

PAVLETIC, Z.
Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

PAVLOU, S. P.
Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

PEARCE, J. B.
Distribution and Abundance of Heavy Metals in Finfish, Invertebrates and Sediments Collected at a Deep Water Disposal Site,
W77-04046 5B

PELTON, V. C.
Water Resources Data System,
W77-03728 7C

PENUMALLI, B. R.
Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

PERSHINA, T. P.
Electrochemical Purification of Effluents from the Manufacture of Sulfite and Kraft Pulps (Elektrokhimicheskaya ochistka stochnykh vod ot proizvodstva sul'fitnoi i sul'fatnoi tsellyulozy),
W77-03815 5D

PETERMANN, E. P.
Effect of Residues from Effluent Treatment During Solid Board Manufacture (Auswirkung von Rueckstanden aus der Abwasserreinigung bei der Vollpappenerzeugung),
W77-03819 5D

PETERS, G. B.
Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

PETERSON, E. C.
Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

PETHIG, R.
Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

PFANNKUCHE, O.
On the Fauna of a Freshwater Flat in the Elbe Estuary (Germany), (In German),
W77-04087 5C

PHILLIPS, G. A.
Adsorption of C14-DDT to Particle Surfaces,
W77-03658 5B

PICKETT, R. A. II.
The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

PIRIE, B. J. S.
The Kinetics of Accumulation and Excretion of Ferric Hydroxide in Mytilus Edulis (L.) and its Distribution in the Tissues,
W77-04028 5C

PISANO, M. A.
Nonpoint Sources of Pollution: A Federal Perspective,
W77-04017 5G

POBEDINSKII, A. V.
Alteration of Water Regulating and Protective Features of the Forest Under Influence of Forestry Measures, (In Russian),
W77-04002 4C

POND, S.
Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

POPEA, F.
Microbiological and Chemical Study of Water in the Baia de Aries Mine, (In Romanian),
W77-04077 5A

PRESTRIDGE, E. B.
Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

PRIKHOD'KO, T. I.
Study of the Production Process of Daphnia Longiremis Sars Population from Lake Dalnee by Means of a Mathematical Model, (In Russian),
W77-04055 5C

PRINCE, R. D.
Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

PRINS, D. A.
Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

PROKACHEVA, V. G.
Estimate of the Suitability of Television Information from Meteorological Meteor Satellites for Determining Ice Conditions in Lakes and Reservoirs,
W77-03765 2C

Hydrologic Aspects of Space Investigations of the Earth's Surface (Literature Survey),
W77-03848 7B

Some Problems in the Study of the Inundation of River Flood Plains by Aerospace Methods,
W77-03847 4A

PTITSA, R. P.
Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

PULVER, T. R.
Suggested Mangrove Transplanting Techniques,
W77-03951 5G

QADRI, S. U.
Origin and Fate of Mercury Compounds in Fish,
W77-03674 5B

RABBON, P.
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

RAKHMANINA, N. A.
Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

RAKUSHINA, V. I.
Use of Effluents from Fermentation Plants for Field Irrigation (Ispol'zovanie stochnykh vod gidroliznykh zavodov dlya orosheniya polei),
W77-03814 5D

RAMAKRISHNA, Y. S.
Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

RAND, J. L.
The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

RANKL, J. G.
Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

RAUDKIVI, A. J.
Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

REED, J. R.
Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

REES, C. P.
An Assessment of the Pollution of Cornish Coastal Waters,
W77-04061 5B

REIMERS, R. S.
Transport and Distribution of Mercury in Sediments,
W77-03669 5B

REKLIS, D. M.
Reliability, Trade-Offs, and Water Resources Development Modeling with Multiple Crops,
W77-03939 6A

RHEINHEIMER, G.
Comparative Investigations on the Self-Purification in Polluted Waters of Different Salinities, (In German),
W77-04098 5G

RIGHTMIRE, C. T.
Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

RILEY, J. P.
The Distribution of Short-Chain Halogenated Aliphatic Hydrocarbons in Some Marine Organisms,
W77-04051 5C

RINALDI, S.
Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

RINEHART, J. S.
Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

ROBERTS, M.
Institutions and Objectives on the Water, Energy, Environment Interface,
W77-03934 6B

ROBERTS, M. J.
Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

ROBERTS, R. D.
Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

ROBERTS, T. M.
Distribution of Heavy Metals in Tissues of the Common Seal,
W77-04059 5C

ROBERTSON, J. B.
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

RODIONOVA, M. S.
Study on the Purification of Sewage Water in Soils of Western Siberia, (In Russian),
W77-04090 5G

ROEFS, T. G.
Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

ROGERS, R. G.
Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

ROGERS, R. L.
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

ROINESTAD, F. A.
Phosphorus Removal from Wastewater,
W77-03867 5D

ROLSTON, D. E.
Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

ROSS, C. K.
Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

ROUSSEAU, A.
Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

RUBAK, E.
Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

RUMYANTSEV, G. I.
Current Problems of Hygienic Standardization of New Chemical Substances, (In Russian),
W77-04015 5C

RUSS, C. F.
Phosphorus Removal from Wastewater,
W77-03867 5D

RUSSELL, T. E.
Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

RUST, B. R.
The Distribution and Transport of Bed Sediments and Persistent Pollutants in the Ottawa River, Canada,
W77-03645 5B

RYDSTROM, J. F.
Damages Compensable Under Federal Maritime Law for Injuries Caused by Discharge of Oil into Navigable Waters,
W77-03711 5G

RYUMIN, V. G.
Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

SADLER, H. E.
Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

SAENKO, G. H.
Concentration of Polyvalent Metals by Seaweeds in Vostok Bay, Sea of Japan,
W77-04023 5C

SAGER, M.
Modeling and Information Handling in Environmental Science,
W77-03926 5G

SAINDON, L. G.
Hydrology of the Solid Waste Burial Ground, As Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory,
W77-03874 5B

SALIBA, L. J.
Acclimation and Tolerance of Artemia Salina to Copper Salts,
W77-04044 5C

Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

SAMBORSKII, N. V.
Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

SAMPSON, R. C. J.
Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

SAMSONOV, D. A.
Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

SANDBERG, A.
Modern Technique for Sediment Removal (Modern teknik for sedimentupptagning),
W77-03822 5D

SANKHAYAN, S. D.
Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

SARGENT, D. H.
Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

SASSEVILLE, J. L.
Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

SASTRI, V. S.
Reverse Osmosis for the Treatment of Metal Waste Solutions,
W77-03610 5D

SAVEL'EVA, G. F.
Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

SAWYER, J. W. JR.
Modeling Process Substitutions by LP and MIP,
W77-03933 5G

SAYEED, H.
Mercury Transport by Bed Sediment Movements,
W77-03647 5B

SCHERF, H. R.
Toxicological Effects of Diethylnitrosamine (DENA) in Guppies (Lebistes Reticulatus), (In German),
W77-04100 5C

SCHINDLER, J. E.
A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

SCHMUTZER, C.
Comparative Investigations on the Self-Purification in Polluted Waters of Different Salinities, (In German),
W77-04098 5G

SCHOTTEL, J.
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

SCHUBERT, R.
The Detection of Aeromonads of the Hydrophila-Punctata-Group, In The Hygienic Analysis of Drinking Water, (In German),
W77-04092 5A

SCHUMANN, H. H.
Operational Applications of Satellite Snowcover Observations and Landsat Data Collection Systems Operations in Central Arizona,
W77-03971 2C

SCHWAB, G. M.
Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

SCHWARTZ, A. K. JR.
National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

SCOTT, J. T.
Nearshore Currents Off Long Island,
W77-03754 2L

SEARL, T. D.
Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

SEGEBARTH-ORBAN, R.
Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

SEKERKA, I.
Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

SEKRETAREVA, L. F.
Purification of Residual Liquor from Yeast Production (Ochistka posledrozhzhevoi brazhki),
W77-03811 5D

SELIVANOV, V. G.
Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

SEMENOV, V. P.
Synthetic Flocculants for the Purification of Kraft Mill Effluents (Sinteticheskie flokulyanty dlya ochistki stochnykh vod sul'fatno-tsellyuloznogo proizvodstva),
W77-03812 5D

SEMENOVA, A. A.
Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

SHAH, C. M.
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

SHAMIR, U.
Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

SHARMA, H. R.
Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

SHEARMAN, J. O.
Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

SHECHTER, M.
Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

SHEN, H. W.
Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

SHERK, J. A.
Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

SHIPTON, R. J.
Flow in Corrugated Pipes,
W77-03744 8B

SHIU, W. Y.
Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

SHUKLA, U. C.
Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

SHULAKOVA, K. G.
Reduction of Deposit Formation in Heat Exchangers (Snizhenie osadkoobrazovaniya v teploobmennoi apparature),
W77-03808 8G

SIDORENKO, G. I.
Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

SIEVERT, A. C.
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

SILVER, B.
Identification of 1,1,1-Trichloroacetone (1,1,1-Trichloropropanone) in Two Drinking Waters: A Known Precursor in Haloform Reaction,
W77-03794 5A

SILVER, S.
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

SIMON, J.
Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

SIMS, W. A.
The Symmetry of Effluent Charges and Subsidies for Pollution Control,
W77-03962 5G

SINCLAIR, N. A.
Phosphorus Removal from Wastewater,
W77-03867 5D

SINGH, A.
Rainfall Erosivity Analysis of Soil Conservation Research Centre, Vasad(Gujarat),
W77-03627 4D

SINGH, R. P.
Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

SINITSYN, V. G.
Use of Effluents from Fermentation Plants for Field Irrigation (Ispol'zovanie stochnykh vod gidroliznykh zavodov dlya orosheniya polei),
W77-03814 5D

SINNARWALLA, A. M.
Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

SMART, G.
The Effect of Ammonia Exposure on Gill Structure of the Rainbow Trout (Salmo Gairdneri),
W77-04056 5C

SMILEY, T. L.
The Consequences of Fooling Mother Nature,
W77-03738 2B

SMITH, D. J.
Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

SMITH, S. D.
Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

SMITH, V. E.
The Application of HYMO to Study Areas of Southwestern Wyoming for Surface Runoff and Soil Loss Estimates,
W77-03729 4A

Water Resources Data System,
W77-03728 7C

SMITH, V. K.
A Note on Effluent Charges and Market Structure,
W77-03955 5G

SMOLEW, T.
Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

SNIEGOCKI, R. T.
Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

SNYDER, J. H.
Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

SODERHJELM, L.
Possible uses for Fibrous Sludges from the Pulp and Paper Industry,
W77-03817 5E

SOKIRKO, T. D.
Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

SOLOV'EVA, L. I.
Purification of Residual Liquor from Yeast Production (Ochistka posledrozhzhevoi brazhki),
W77-03811 5D

SONCINI-SESSA, R.
Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

SORIANO, A.
Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

SOUTHWICK, E. M.
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

SPENCE, M.
Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

STALDER, K.
Studies on the Recurrence of Bacterial Flora in Drinking Water After Ozonization, (In German),
W77-04074 5F

STARNES, P. K.
Hydrocarbons in a Wilderness Lake,
W77-04048 5B

STEFAN, H.
River and Cooling Water Temperature Fluctuations,
W77-03834 5B

STEHFEST, H.
Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

STEPIEN, G. JR.
Product and Method for Reducing Water Loss Through Soil by Seepage,
W77-03863 3B

STEPP, J. M.
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

STEVENS, F.
Great Lakes (Paper Co.) Pioneers Tomorrow's Technology,
W77-03809 5D

STOCKNER, J. G.
Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Marine Phytoplankton Growth in High Concentrations of Pulp Mill Effluent,
W77-03798 5C

STOLBUNOV, A. K.
Microbial Processes of Phenol Degradation in the Volga and its Reservoirs, (In Russian),
W77-04064 5C

STRAKA, W.
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

STRELCHUK, D. L.
Multivariable Flood Level Frequency Distributions,
W77-03996 8B

STRELTSOVA, T. D.
Unsaturated Zone and Vertical-Flow Components in Draining Unconfined Formations,
W77-04000 2F

STRIZHAK, E. K.
Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
W77-04016 5G

SUBBARAO, Y. V.
Reaction Products of Polyphosphates and Orthophosphates with Soils and Influence on Uptake of Phosphorus by Plants,
W77-03636 3F

SUFFET, I. H.
Identification of 1,1,1-Trichloroacetone (1,1,1-Trichloropropanone) in Two Drinking Waters: A Known Precursor in Haloform Reaction,
W77-03794 5A

SULAM, D. J.
Distribution and Trend of Nitrate, Chloride, and Total Solids in Water in the Magothy Aquifer in Southeast Nassau County, New York, From the 1950's Through 1973,
W77-03887 5B

SULLIVAN, L. G.
Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

SULTANKHODZHAYEV, A. N.
Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters,
W77-03990 2K

SUNDARAM, T. R.
Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

SUZUKI, T.
Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

SVITEL'SKII, V. P.
Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

SWAIN, F. M.
Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

SYROVATKO, V. N.
Electrochemical Purification of Effluents from the Manufacture of Sulfite and Kraft Pulps (Elektrokhimicheskaya ochistka stochnykh vod ot proizvodstva sul'fitnoi i sul'fatnoi tsellyulozy),
W77-03815 5D

SZAREK, S. R.
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

SZIDAROVSZKY, F.
Application of Game Theory in Water Management,
W77-04009 6A

TABATA, S.
Evidence of a Westward-Flowing 'Subarctic Countercurrent' in the North Pacific Ocean,
W77-03760 2L

Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

TABUNSHCHIKOV, V. V.
Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

TAGGER, S.
The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

TANG, C. L.
Spectra and Coherence of Wind-Generated Internal Waves,
W77-03982 2L

TEAS, H. J.
Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

TELEKI, P. G.
Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

TESSIER, A.
Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

THEAKSTONE, W. H.
Glacial Lake Sedimentation, Austerdalsisen, Norway,
W77-04005 2J

THOMAS, R. L.
The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

THOMPSON, R. G.
National Economic Models of Industrial Water use and Waste Treatment,
W77-03928 5D

THOMPSON, S. R.
Method of Disposing Sludges Containing Soluble Toxic Materials,
W77-03866 5E

THOMSON, R. E.
Tidal Currents and Estuarine-Type Circulation in Johnstone Strait, British Columbia,
W77-03846 2L

THORHAUG, A.
Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

TIEFENBRUNNER, F.
Microcalorimetric Investigations in Polluted Surface Waters, (In German),
W77-04091 5A

The Use of Enzyme-Kinetic-Methods for Bacteriological Examinations of Heavily Polluted Surface Waters, (In German),
W77-04094 5C

TIERNEY, G. M.
The National Flood Insurance Program: Explanation and Legal Implications,
W77-03956 6F

TIMKO, E.
Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry, Phase I - Sample Aging Study,
W77-03922 5A

TING, I. P.
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

TITUS, P. E.
A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

TIXERONT, J.
Intensity of Rainfall in Clermone-Ferrand, (In French),
W77-04032 2B

TOPOROVA, T. K.
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

TOTH, K.
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

TOWNSEND, D. R.
Mercury Transport by Bed Sediment Movements,
W77-03647 5B

TOY, T. J.
An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

TRENTACOSTE, N. P.
Development of Fast Current Oil Response System,
W77-03904 5G

TROTTA, L. C.
Ground-Water Resources and Geology of Jefferson County, Wisconsin,
W77-03889 4B

TRUSKI, R.
Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

TURNIPSEED, S. S.
Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

TYBOUT, R. A.
Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

TYLER, B. D.
Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

UCHIDA, T.
Device for Purifying Sewage,
W77-03869 5D

ULJANTSEVA, I. M.
Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

ULLREY, D. E.
Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri),
W77-04039 5C

ULRICH, C.
Wet Oxidation of Clarification Sludge and Pulp Effluent by the Zimpro Process (Nassoxydation von Klaerschlamm und Zellstoffablauge mit dem Zimpro-Verfahren),
W77-03823 5D

UNGER, E.
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

UNNY, T. E.
Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

URAY, Z.
Thyroid Modifications in Rats after Administration of Mineral Residue from Drinking Water, (In French),
W77-04089 5C

USACHEV, V. F.
Some Problems in the Study of the Inundation of River Flood Plains by Aerospace Methods,
W77-03847 4A

UZUNER, M. S.
Theoretical Model of River Ice Jams,
W77-03745 2C

VAITUZIS, Z.
Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

VAKHRUSHEV, V. I.
Use of New Type of Membrane Filters in Isolating Salmonella from Water of Surface Reservoirs, (In Russian),
W77-04082 5A

VAN BAVEL, C. H. M.
Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

VAN COILLIE, R.
Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

VAN U'U, N.
Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

VANSTONE, W. E.
Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

VAPPICHA, V. N.
An Approximate Solution for the Transient Interface in a Coastal Aquifer,
W77-04001 2F

VENDEREVSKII, A. D.
Electrochemical Purification of Effluents from the Manufacture of Sulfite and Kraft Pulps (Elektrokhimicheskaya ochistka stochnykh vod ot proizvodstva sul'fitnoi i sul'fatnoi tsellyulozy),
W77-03815 5D

VENEDIKTOV, P. S.
Use of Recording Method of Afterglow of Green Algae in Determining Soil and Water Pollution by Phytoxic Substances, (In Russian),
W77-04097 5C

VERBITSKAYA, G. V.
Experimental and Field Studies in Hygienic Assessment of Drinking Water Containing Boron, (In Russian),
W77-04033 5G

VERMEER, K.
Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

VERNET, J. P.
Heavy Metal Pollutants in the Sediments of the Rhone River,
W77-03651 5B

VERPLANCKE, H.
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

VILENSKAYA, E. I.
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

VINCENT, C. E.
Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

VISSER, S. A.
Dynamics of Microbially Produced Fulvic Material in Aquatic Environments Relative to Different Conditions of Temperature and pH,
W77-03664 5C

Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

VITVITSKAYA, B. R.
Hygienic Assessment of the Destruction Products of Surfactants in Water Ozonization, (In Russian),
W77-03772 5D

VONDER HAAR, S. P.
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

VOWINCKEL, E.
Experiments with the Surface Heat and Water Budgets of the Canadian Middle North,
W77-03749 2D

WAGNER, K. D.
Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

WAHLER, M.
Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

WALDICHUK, M.
Coastal Marine Pollution and Fish,
W77-03902 5C

WALIN, G.
On the Description of the Hydrographic State and the Circulation in the Baltic Deep Water,
W77-04006 2L

WALKER, E. R.
A Canadian Arctic Fjord with Some Comparisons to Fjords of the Western Americas,
W77-03977 2L

WALKER, J. D.
Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

Some Effects of Petroleum on Estuarine and Marine Micro-Organisms,
W77-04063 5C

WALKER, J. N.
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

WALKER, R. W.
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

WALLIN, M.
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

WALTER, A.
High Seas Oil Pollution: Particulate Petroleum Residues in the North Atlantic,
W77-04025 5B

WARNOCK, R. G.
Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

WASLENCHUK, D. G.
The Distribution and Transport of Bed Sediments and Persistent Pollutants in the Ottawa River, Canada,
W77-03645 5B

WELCH, D.
Coastal Zone Management in Florida,
W77-03699 6E

WELLINGS, S. R.
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

WENZLOFF, D. R.
Distribution and Abundance of Heavy Metals in Finfish, Invertebrates and Sediments Collected at a Deep Water Disposal Site,
W77-04046 5B

WESTERMAN, P. W.
Evaporative Cooling of a Partially-Wet and Transpiring Leaf-I. Computer Model and Its Evaluation Using Wind-Tunnel Experiments,
W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

WEYERMULLER, R. G.
Flow at Grade-Break from Mild to Steep Slopes,
W77-03746 8B

WHELAN, T.
Long-Term Chemical Effects of Petroleum in South Louisiana Wetlands - 1. Organic Carbon in Sediments and Waters,
W77-04043 5C

WHITEHEAD, R. L.
Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

WHITNEY, R. R.
Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

WIEDINGER, A. R.
Artificial and Natural Lakes,
W77-03694 6E

WIEKHORST, W. B.
Effects of Dietary Aroclor (R) on Channel Catfish (Ictalurus Punctatus) and the Selective Accumulation of PCB Components,
W77-04034 5C

WILLIAMS, D. J.
A Report on the Methylmercury Situation in Par Pond,
W77-03954 5B

WILLIAMS, R. B.
Analytic Equation of State for Sea Water,
W77-03770 1B

WILLIAMS, S. J.
Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

WILLIAMSON, S.
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

WILLIS, G. H.
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

WILSON, C. A.
Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

WILSON, K. D.
Analysis of Pollution from Marine Engines and Effects on the Environment. Southern Lakes,
W77-03900 5C

WILSON, K. W.
The Effect of China Clay on the Fish of St. Austell and Mevagissey Bays,
W77-04049 5C

WINDAUS, G.
Effect of Residues from Effluent Treatment During Solid Board Manufacture (Auswirkung von Rueckstanden aus der Abwasserreinigung bei der Vollpappenerzeugung),
W77-03819 5D

WOLKOFF, A. W.
Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

WOLLMAN, N.
Water Resource Models: A Historical Summary,
W77-03925 6A

WOOD, K. V.
Effects of Suspended and Deposited Sediments on Estuarine Organisms - Phase II,
W77-03901 5C

WOOD, N. J.
Public Choice and Urban Water Quality,
W77-03960 6B

WORKER, G. F. JR.
Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

WUN, C. K.
The Use of XAD-2 Resin for the Analysis of Coprostanol in Water,
W77-03767 5A

YAKOVLEVA, G. P.
Bactericidal Action of Electrohydraulic Effect in Water, (In Russian),
W77-04088 5C

YALL, I.
Phosphorus Removal from Wastewater,
W77-03867 5D

YAMAUCHI, H.
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

YOUNG, D-L.
Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

YOUNG, H. W.
Geothermal Investigations in Idaho, Part 4, Isotopic and Geochemical Analses of Water from the Bruneau-Grand View and Weiser areas, Southwest Idaho,
W77-03896 1A

YOUNG, R. H. F.
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
W77-03825 5C

Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
W77-03826 5B

YOUNGSTROM, M. P.
Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

YUROVSKAYA, E. M.
Behavior of Pathogenic and Sanitary-Indicator Bacteria Under Conditions of Water Pollution by Organophosphorus Pesticides, (In Russian),
W77-04099 5C

ZAKHAROVA, L. P.

ZAKHAROVA, L. P.
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

ZAKHARTSOVA, L. M.
Use of Effluents from Fermentation Plants for Field Irrigation (Ispol'zovanie stochnykh vod gidroliznykh zavodov dlya orosheniya polei),
W77-03814 5D

ZEITOUN, I. N.
Mineral Metabolism During the Ontogenesis of Rainbow Trout (Salmo Gairdneri),
W77-04039 5C

ZELAZOWSKA, E.
Effect of Dyes Used in the Textile Industry on the Purification of Effluents by the Activated Sludge Process (Wplyw niektorych barwnikow stosowanych w przemysle wlokienniczym na oczyszczanie sziekow osadem czynnym),
W77-03821 5D

ZENCHELSKY, S. T.
The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

ZILBERMAN, D.
Examination of Environmental Policies Using Production and Pollution Microparameter Distributions,
W77-03961 6G

ZITKO, V.
Trends of PCB and DDT in Fish and Aquatic Birds,
W77-03677 5B

ZONOVA, L. D.
Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

ZOULALIAN, V.
Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

ZUKER, M.
Computer Modeling,
W77-03679 5B

ZUNJIC, K.
Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

ORGANIZATIONAL INDEX

ABO AKADEMI, TURKU (FINLAND). INST. OF BIOLOGY.
Meromictic Mechanisms in a Coastal Lake, (In Finnish),
W77-04071 5C

AGRICULTURAL RESEARCH SERVICE, BATON ROUGE, LA.
Losses of Diuron, Linuron, Fenac, and Trifluralin in Surface Drainage Water,
W77-03639 5G

AGRICULTURAL RESEARCH SERVICE, OXFORD, MISS. SEDIMENTATION LAB.
Stability of Channel Beds by Amoring,
W77-03836 8B

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Atmospheric Dust and Surface Albedo: Effects on Desertification,
W77-03739 2D

AHMADU BELLO UNIV., ZARIA (NIGERIA). DEPT. OF CIVIL ENGINEERING.
Analysis of One-Dimensional Non-Darcy Vertical Infiltration,
W77-03752 2F

AIX-MARSEILLE-3 UNIV. (FRANCE). LABORATOIRE DE MICROBIOLOGIE.
The Conditions for Biodegradation of Petroleum Hydrocarbons at Sea,
W77-04042 5B

AKADEMIYA NAUK LITOVSKOI, SSR, VILNIUS. INST. OF BOTANY.
Radioecological Study of Charophyta, (In Russian),
W77-04068 5C

AKADEMIYA NAUK SSR, MOSCOW. INSTITUT BIOLOGII VNUTRENNYKH VOD.
Effect of Temperature on Seasonal Dynamics of The Number of Fecundity of Leptodora Kindtii (Focke) (Cladocera) in the Region of the Heated Waters of the Konakovo State Regional Electric Power Plant, (In Russian),
W77-03691 5C

AKADEMIYA NAUK SSSR, MOSCOW. INST. OF EVOLUTIONARY PHYSIOLOGY.
Study of the Production Process of Daphnia Longiremis Sars Population from Lake Dalnee by Means of a Mathematical Model, (In Russian),
W77-04055 5C

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT BIOLOGII VNUTRENNYKH VOD.
Microbial Processes of Phenol Degradation in the Volga and its Reservoirs, (In Russian),
W77-04064 5C

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT GEOGRAFII.
Use of Satellite Survey Material in Glaciological Investigations,
W77-03851 2C

Role of the Snow Cover in the Nature of Northern Landscapes and Its Physical Properties,
W77-03988 2C

Change in Some Elements of the River Regime in the Lower Ob' Region Upon Flow Regulation (In Relation to the Redistribution of Water Resources in the Central Region),
W77-03989 4A

AKADEMIYA NAUK SSSR, PUSHCHINO. INST. OF BIOCHEMISTRY AND PHYSIOLOGY OF MICROORGANISMS.
Bdelovibrio Bacteriovorus as a Factor of the Self-Purification of River Water, (In Russian),
W77-04095 5G

AKADEMIYA NAUK SSSR, VLADIVOSTOK.
Concentration of Polyvalent Metals by Seaweeds in Vostok Bay, Sea of Japan,
W77-04023 5C

AKADEMIYA NAUK URSR, KIEV. INSTYTUT HIDROBIOLOGII.
Effect of Various Factors on Glucose Decomposition Rate in Natural Waters, (In Russian),
W77-03862 5C

Estimation of the Production Potentials of the Phytobenthos in the Northern Donets-Donets Basin Canal,
W77-04069 5C

Primary Production of Green Filamentous Algae from the Kiev Reservoir, (In Russian),
W77-04070 5C

Microbiological Characteristics of the Ros/ River and Some of Its Tributaries, (In Russian),
W77-04093 5C

AKADEMIYA NAUK UZBEKSKOI SSR, TASHKENT. INSTITUT SEISMOLOGII.
Earthquake-Related Change of the Hydrogen Ion Concentration (pH) in Ground Waters,
W77-03990 2K

ALASKA UNIV., COLLEGE. INST. OF MARINE SCIENCE.
Primary Productivity of the Benthic Microalgae in the Churchi Sea Near Barrow, Alaska,
W77-03782 5C

ALL-UNION RESEARCH INST. OF MARINE FISHERIES AND OCEANOGRAPHY, MOSCOW (USSR).
The Effect of Dissolved Petroleum Products on Some of the Aspects of Carbohydrate Metabolism in Fishes and Invertebrates,
W77-04030 5C

AMERICAN UNIV., WASHINGTON, D. C. COLL. OF PUBLIC AFFAIRS.
Modeling and Information Handling in Environmental Science,
W77-03926 5G

ARIZONA UNIV. TUCSON. DEPT. OF GEOSCIENCES.
The Consequences of Fooling Mother Nature,
W77-03738 2B

ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES.
The Effect of the Central Arizona Project on the Thermal Structure of Lake Havasu,
W77-03624 2H

Estimated Water Balance for the Proposed Haditha Reservoir on the Euphrates River in Iraq,
W77-03625 4A

ARIZONA UNIV., TUCSON. DEPT. OF PLANT SCIENCES.
Isolation and Characterization of Drought Tolerance in a Grain Sorghum (Sorghum Bicolor (L) Moench) Randommating Population,
W77-03623 2I

ARIZONA UNIV., TUCSON. DEPT. OF SOILS, WATER, AND ENGINEERING.
Segments of a Vicious Circle: Land Degradation and Water Resources,
W77-03740 4C

ARIZONA UNIV., TUCSON. DEPT. OF SYSTEMS AND INDUSTRIAL ENGINEERING; AND ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES.
Uncertainty in the Return Period of Maximum Hydrologic Events: A Bayesian Approach,
W77-03972 2A

ARIZONA UNIV., TUCSON. OFFICE OF ARID LANDS STUDIES.
Geothermal Technoecosystems and Water Cycles in Arid Lands,
W77-03966 6G

ATKINS RESEARCH AND DEVELOPMENT, EPSON (ENGLAND).
An Assessment of the Pollution of Cornish Coastal Waters,
W77-04061 5B

AUCKLAND UNIV. (NEW ZEALAND). DEPT. OF CIVIL ENGINEERING.
Soil Moisture Movement by Temperature Gradient,
W77-03861 2G

BATTELLE COLUMBUS LABS., OHIO.
Transport and Distribution of Mercury in Sediments,
W77-03669 5B

BEDFORD INST., DARTMOUTH (NOVA SCOTIA). ATLANTIC GEOSCIENCE CENTER; AND BEDFORD INST. OF OCEANOGRAPHY, DARTMOUTH (NOVA SCOTIA). ENVIRONMENTAL MARINE GEOLOGY.
Geochemical Interaction in the Recently Industrialized Strait of Canso,
W77-03649 5B

BEDFORD INST. OF OCEANOGRAPHY, DARMOUTH (NOVA SCOTIA).
High Seas Oil Pollution: Particulate Petroleum Residues in the North Atlantic,
W77-04025 5B

BEDFORD INST. OF OCEANOGRAPHY, DARMOUTH (NOVA SCOTIA). ATLANTIC GEOSCIENCE CENTRE; AND BEDFORD INST. OF OCEANOGRAPHY, DARTMOUTH (NOVA SCOTIA). ENVIRONMENTAL MARINE GEOLOGY.
Accumulation and Distribution of Total Mercury in Estuarine Sediments,
W77-03857 5B

BEDFORD INST. OF OCEANOGRAPHY, DARTMOUTH (NOVA SCOTIA).
Runoff Regulation for Hydro-Power and Its Effect on the Ocean Environment,
W77-03974 2E

Uptake and Retention of Kuwait Crude Oil and its Effects on Oxygen Uptake by the Soft-Shell Clam, Mya Arenaria,
W77-04026 5C

BEDFORD INST., OF OCEANOGRAPHY, DARTMOUTH (NOVA SCOTIA). ATLANTIC OCEANOGRAPHIC LAB.
The Role of Flocculation in the Transport of Particulate Pollutants in the Marine Environment,
W77-03646 5B

Measurements of a Small Near-Bottom Cyclonic Circulation Near the Gulf Stream Axis,
W77-03842 2L

Spectral Analysis of the Long-Term Oceanographic Time Series at Ocean Weather Station 'P',
W77-03843 2L

Spectrum of Small-Scale Oceanic Temperature Gradients,
W77-03979 2L

Recent Measurements of Wind Stress on Arctic Sea Ice,
W77-03980 2C

BEDFORD INST. OF OCEANOGRAPHY, DARTMOUTH (NOVA SCOTIA). MARINE ECOLOGY LAB.
Adsorption of C14-DDT to Particle Surfaces,
W77-03658 5B

BIRMINGHAM UNIV. (ENGLAND). DEPT. OF CIVIL ENGINEERING.
Analytic Solutions for Drawdowns in Rectangular Artesian Aquifers,
W77-03854 4B

Unsaturated Zone and Vertical-Flow Components in Draining Unconfined Formations,
W77-04000 2F

BRISTOL UNIV. (ENGLAND). RESEARCH UNIT FOR COMPARATIVE ANIMAL RESPIRATION.
The Effect of Ammonia Exposure on Gill Structure of the Rainbow Trout (Salmo Gairdneri),
W77-04056 5C

BRITISH COLUMBIA DEPT. OF RECREATION AND CONSERVATION, PENTICTON. FISH AND WILDLIFE BRANCH.
Nitrogen and Phosphorous Removal from Lakes by Fish Harvest,
W77-04035 5G

BRITISH COLUMBIA RESEARCH COUNCIL, VANCOUVER. DIV. OF APPLIED BIOLOGY.
Trace Metals (As, Cd, Cu, Fe, and Zn) in Arctic COD, Boreogadus Saida and Selected Zooplankton from Strathcona Sound, Northern Baffin Island,
W77-04057 5C

BRITISH COLUMBIA UNIV., VANCOUVER. INST. OF OCEANOGRAPHY.
Subsurface Currents in the Strait of Georgia, West of Sturgeon Bank,
W77-03845 2L

Wind and the Surface Circulation of a Fjord,
W77-03976 2L

Spectra and Coherence of Wind-Generated Internal Waves,
W77-03982 2L

Strait of Georgia Oscillations: Low-Frequency Currents and Topographic Planetary Waves,
W77-03983 2L

BRITISH COLUMBIA UNIV., VANCOUVER. WESTWATER RESEARCH CENTRE.
Trace Metal Pollution from a Metropolitan Area: Sources and Accumulation in the Lower Fraser River and Estuary,
W77-03652 5B

BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Nearshore Currents Off Long Island,
W77-03754 2L

BROWNING-FERRIS INDUSTRIES, INC., HOUSTON, TEX. (ASSIGNEE).
Method of Disposing Sludges Containing Soluble Toxic Materials,
W77-03866 5E

BRUSSELS UNIV. (BELGIUM). LAB. OF COMPARATIVE ANATOMY.
Data on Seasonal Variations in Plankton and on the Hydrologic Characteristics of the North Sea, Off Ostende and Nieuwpoort: Period from 1969 to 1971, (In French),
W77-04072 5C

BUENOS AIRES UNIV. (ARGENTINA). DEPT. OF ECOLOGY.
Yield Responses of Two Maize Cultivars Following Short Periods of Water Stress at Tasseling,
W77-03628 3F

BUREAU OF MINES, BARTLESVILLE, OKLA. BARTLESVILLE ENERGY RESEARCH CENTER.
Crude Oil Spills Research. An Investigation and Evaluation of Analytical Techniques,
W77-03910 5A

BUREAU OF RECLAMATION, WASHINGTON, D. C
Fryingpan--Arkansas Project Colorado, Final Environmental Statement,
W77-03702 8A

CAIRO UNIV., GIZA (EGYPT). FACULTY OF AGRICULTURE.
Effect of Moisture Content on Soil Consistency,
W77-03631 2G

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD, SACRAMENTO.
California Water Law in Perspective,
W77-03689 6E

CALIFORNIA UNIV., BERKELEY. COLL. OF NATURAL RESOURCES.
Desert Repaired in Southeastern Oregon: A Case Study in Range Management,
W77-03742 4D

CALIFORNIA UNIV., BERKELEY. DIV. OF HYDRAULIC AND SANITARY ENGINEERING.
Mixing of Submerged Two-Dimensional Buoyant Jets in Uniform Bodies of Water in the Absence and Presence of Wind Action,
W77-03828 8B

CALIFORNIA UNIV., BODEGA BAY. BODEGA MARINE LAB.
Relationships of Epibiotic Fouling and Mortalities of Eggs of the Dungeness Crab (Cancer Magister),
W77-04040 5C

CALIFORNIA UNIV., DAVIS. DEPT. OF CIVIL ENGINEERING.
Mathematical Modeling of Estuarial Ecosystems,
W77-03682 5B

Laboratory Techniques in the Prediction of Soil Erodibility,
W77-03827 4D

CALIFORNIA UNIV., DAVIS. DEPT. OF PATHOLOGY.
Fin Erosion Disease of Starry Flounder (Platichthys Stellatus) and English Sole (Parophrys Vetulus) in the Estuary of the Duwamish River, Seattle, Washington,
W77-04038 5C

CALIFORNIA UNIV., DAVIS. DEPT. OF WATER SCIENCE AND ENGINEERING; AND CALIFORNIA UNIV., DAVIS. ECOLOGY GRADUATE GROUP.
The Influence of Temperature on the Bioenergetics of the Carnivorous Stonefly Nymph, Acroneuria California Banks (Plecoptera: Perlidae),
W77-03641 5C

CALIFORNIA UNIV., EL CENTRO. IMPERIAL VALLEY FIELD STATION.
Effect of Urea and Ammonium Sulphate Applied Before Sowing on Sudangrass Seedlings,
W77-03633 3C

CALIFORNIA UNIV., LOS ANGELES.
Coordinating Scale and Sequencing Decisions for Water Resources Projects,
W77-03930 6A

CALIFORNIA UNIV., RICHMOND. SANITARY ENGINEERING RESEARCH LAB.
Iron Transport in a Lake Tahoe Tributary and its Potential Influence upon Phytoplankton Growth,
W77-04022 5B

CALIFORNIA UNIV., RIVERSIDE. DEPT. OF BIOLOGY.
Physiological Responses to Rainfall in Opuntia Basilaris (Cactaceae),
W77-03622 2I

CALIFORNIA UNIV., SANTA BARBARA. DEPT. OF BIOLOGICAL SCIENCES.
The Decomposition of Leaves in Two Southern California Streams,
W77-03829 5B

CANADA CENTRE FOR INLAND WATERS,BURLINGTON (ONTARIO).
The Distribution and Transport of Mercury in the Sediments of the Laurentian Great Lakes System,
W77-03643 5B

Transverse Dispersion in Meandering Channels,
W77-03644 2E

Electron Capture Gas Chromatographic Methodology for the Quantitation of Polychlorinated Biphenyls: Survey and Compromise,
W77-03779 5A

Determination of Volatile Halogenated Hydrocarbons in Water by Gas Chromatography,
W77-03787 5A

A Method for the Automatic Measurement of Wave Frequency,
W77-03981 2L

Seiches, Circulation, and Storm Surges of an Ice-Free Lake Winnipeg,
W77-03987 2H

CANADA CENTRE FOR INSLAND WATERS, BURLINGTON (ONTARIO).
Simultaneous Determination of Total, Non-Carbonate and Carbonate Water Hardness by Direct Potentiometry,
W77-03780 5A

CANADIAN WILDLIFE SERVICE, DELTA (BRITISH COLUMBIA).
Colonial Auks and Eiders as Potential Indicators of Oil Pollution,
W77-04029 5A

CARLETON UNIV., OTTAWA (ONTARIO). DEPT. OF CHEMISTRY.
Dynamics of Interaction of Cations and Fulvic Acid,
W77-03662 2K

CATANIA UNIV. (ITALY).
Bacteriological Characteristics of the Coast Waters in the District of Catania (Italy), (In Italian),
W77-04084 5G

CELANESE CHEMICAL CO., BISHOP, TEX.
A Scheme for Effective Control of Effluent pH,
W77-03802 5D

CENTRAL ARID ZONE RESEARCH INST., JODHPUR (INDIA). DRY FARMING RESEARCH MAIN CENTRE.
Moisture Use Efficiency of Dryland Crops as Influenced by Fertilizer Use, III. Oilseed Crops,
W77-03634 3F

CENTRE D'OCEANOGRAPHIE, MARSEILLE (FRANCE). STATION MARINE D'ENDOUME.
Study on the Long-Term Effects of Some Detergents on the Sequence of Development of the Sedentary Polychaete, Capitella Capitata (Fabricius), (In French),
W77-04067 5C

CESKOSLOVENSKA AKADEMIE VED, PRAGUE. HYDROBIOLOGICKA LABORATOR.
Concentration of Organic Substances in Water as a Factor Controlling the Occurrence of Some Ciliate Species,
W77-03839 5C

CHAMPION INTERNATIONAL CORP., STAMFORD, CONN.
Chlorine-Based Bleachery Effluent Treatment,
W77-03806 5D

CLEMSON UNIV., DEPT. OF CIVIL ENGINEERING.
A Mathematical Model for Water Quality Evaluation in the South Carolina Grand Stand,
W77-03731 5B

CLEMSON UNIV., S. C. DEPT. OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY.
The Projected Economic Impact of the Richard B. Russell Dam and Lake Upon South Carolina,
W77-03735 6B

CLEMSON UNIV., S. C. DEPT. OF CIVIL ENGINEERING.
A Water Resources Data Management System for South Carolina,
W77-03733 7C

CLEMSON UNIV., S. C. DEPT. OF ENVIRONMENTAL SYSTEMS ENGINEERING.
Design and Operational Criteria for Thickening of Biological Sludges,
W77-03734 5D

COAST GUARD RESEARCH AND DEVELOPMENT CENTER, GROTON, CONN.
An Oil Slick Sampling System,
W77-03909 5A

COAST GUARD, WASHINGTON, D.C.
Tests of Coast Guard Developed High Seas Oil Recovery Systems at EPA Ohmsett,
W77-03905 5G

COASTAL ENGINEERING RESEARCH CENTER, FORT BELVOIR, VA.
Photogrammetric Experiments on Nearshore Mixing and Diffusion,
W77-03907 2L

Construction in the Coastal Zone: A Potential Use of Waste Materials,
W77-03916 6G

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Legal Constraints on Urban Water Systems,
W77-03692 3D

Stochastic Models of Sediment Motion on Flat Bed,
W77-03997 2J

COLORADO UNIV., BOULDER. DEPT. OF MECHANICAL ENGINEERING.
A Subsurface Study of the Mesa Geothermal Anomaly, Imperial Valley, California,
W77-03771 2F

Alternations of Flow Characteristics within Geothermal Areas by Tidal Forces,
W77-03915 2L

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, ST. LUCIA (AUSTRALIA). CUNNINGHAM LAB.
Effect of Water Deficit on Carbon Dioxide Exchange and Leaf Elongation Rate of Panicum Maximum Var. Trichoglume,
W77-03630 2I

CONCORDIA UNIV. MONTREAL (QUEBEC). CANADA, DEPT. OF BIOLOGICAL SCIENCES.
Ontogenetic Variation in the Multiple Hemoglobins of Coho Salmon (Oncorhynchus Kisutch) and Effect of Environmental Factors on their Expression,
W77-04054 5C

CONSIGLIO NAZIONALE DELLE RICERCHE, MILAN (ITALY). CENTRO DI TEORIA DEI SISTEMI.
Optimal Sequencing in Installing Wastewater Treatment Plants,
W77-04019 5D

CORNELL UNIV., ITHACA, N.Y. SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING.
On a Derivable Formula for Long-Wave Radiation from Clear Skies,
W77-03638 2B

Pumping of Aquifer with Viscoelastic Properties,
W77-03995 4B

Unsteady Stratified Circulation in a Cavity,
W77-04003 2H

DALHOUSIE UNIV., HALIFAX (NOVA SCOTIA). DEPT. OF OCEANOGRAPHY.
A Study in the Slope Water Region South of Halifax,
W77-03844 2L

DEFENCE RESEARCH ESTABLISHMENT OTTAWA (ONTARIO).
Water, Heat, and Salt Transports Through Nares Strait, Ellesmere Island,
W77-03978 2L

DELAWARE UNIV., NEWARK. COLL. OF MARINE STUDIES.
Marsh Gas from the Atlantic Coastal Plain,
W77-03913 2L

DELAWARE UNIV., NEWARK. DEPT. OF CIVIL ENGINEERING.
Numerical Models for the Prediction of Wave Set-Up and Nearshore Circulation,
W77-03769 2L

DEPARTMENT OF AGRICULTURE, LETHBRIDGE (ALBERTA). RESEARCH STATION.
Hybrid Computer Model of St. Venant Equations,
W77-03832 2E

DEPARTMENT OF ENERGY, MINES AND RESOURCES, OTTAWA (ONTARIO). EXTRACTION METALLURGY DIV.
Reverse Osmosis for the Treatment of Metal Waste Solutions,
W77-03610 5D

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, LINCOLN (NEW ZEALAND). CROP RESEARCH DIV.
Evaporation and Advection I: Evaporation from Extensive Homogeneous Surfaces,
W77-03859 2D

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, PALMERSTON NORTH (NEW ZEALAND).
Effect of Dew on Leaf Water Potentials and Crop Resistances in a Paspalum Pasture,
W77-03736 3F

DEPARTMENT OF THE ENVIRONMENT, VICTORIA (BRITISH COLUMBIA). FROZEN SEA RESEARCH GROUP, AND DEPARTMENT OF THE ENVIRONMENT, VICTORIA (BRITISH COLUMBIA). OCEAN AND AQUATIC AFFAIRS.
A Canadian Arctic Fjord with Some Comparisons to Fjords of the Western Americas,
W77-03977 2L

DEPARTMENT OF THE ENVIRONMENT, VICTORIA (BRITISH COLUMBIA). INST. OF OCEAN SCIENCES.
Evidence of a Westward-Flowing 'Subarctic Countercurrent' in the North Pacific Ocean,
W77-03760 2L

Tidal Currents and Estuarine-Type Circulation in Johnstone Strait, British Columbia,
W77-03846 2L

Storm Surges in the Southern Beaufort Sea,
W77-03986 2L

DEPARTMENT OF THE ENVIRONMENT, VICTORIA (BRITISH COLUMBIA). OCEAN AND AQUATIC AFFAIRS.
Numerical Model Studies of the Tides Between Vancouver Island and the Mainland Coast,
W77-03984 2L

DEPARTMENT OF THE ENVIRONMENT, VICTORIA (BRITISH COLUMBIA). OCEAN AND AQUATIC AFFAIRS; AND CANADA CENTRE FOR INLAND WATERS, BURLINGTON (ONTARIO).
Numerical Modeling of Tides in Hudson Bay,
W77-03985 2L

DEPARTMENT OF THE ENVIRONMENT, VICTORIA (BRITISH COLUMBIA). OCEAN CHEMISTRY DIV.
Distribution of Low-Molecular-Weight Hydrocarbons in Southern Beaufort Sea,
W77-03793 5B

DEUTSCHES KREBSFORSCHUNGSZENTRUM, HEIDELBERG (WEST GERMANY). INST. OF TOXICOLOGY AND CHEMOTHERAPY.
Toxicological Effects of Diethylnitrosamine (DENA) in Guppies (Lebistes Reticulatus), (In German),
W77-04100 5C

DILLON (M. M.), LTD., TORONTO (ONTARIO).
Multivariable Flood Level Frequency Distributions,
W77-03996 8B

DOW CHEMICAL U. S. A., MIDLAND, MICH.
Partitioning and Uptake of Pesticides in Biological Systems,
W77-03659 5C

DREXEL UNIV., PHILADELPHIA, PA. DEPT. OF CHEMISTRY.
Identification of 1,1,1-Trichloroacetone (1,1,1-Trichloropropanone) in Two Drinking Waters: A Known Precursor in Haloform Reaction,
W77-03794 5A

DUNSTAFFNAGE MARINE RESEARCH LAB., OBAN (SCOTLAND).
Control of Fjordic Deep Water Renewal by Runoff Modification,
W77-03975 2L

EAST CAROLINA UNIV., GREENVILLE. DEPT. OF BIOLOGY.
Primary Productivity and Mineral Cycling in Aquatic Macrophyte Communities of the Chowan River, North Carolina,
W77-03969 5C

EAST STROUDSBURG STATE COLL., PA. DEPT. OF BIOLOGY.
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W77-03947 5G

ECODYNE CORP., UNION, N. J. GRAVER WATER DIV.
Water Treatment for Boiler Operating Pressures Above 1200 PSIG,
W77-03805 3E

ECONOMIC RESEARCH SERVICE, FORT COLLINS, COLO. NATURAL RESOURCE ECONOMICS DIV.
The Effects of Streamflow Variation on Production and Income of Irrigated Farms Operating Under the Doctrine of Prior Appropriation,
W77-03637 3F

ECONOMIC RESEARCH SERVICE, WASHINGTON, D.C.
Water Problems in the Colorado River Basin: Legal and Institutional Framework,
W77-03830 5G

ELECTROLYSIS POLLUTION CONTROL INC., MINNEAPOLIS, MINN. (ASSIGNEE).
Composition for Removal of Immiscible Fluids from Water Surfaces and Lake Beds,
W77-03870 5G

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W77-03783 5G

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Keynote Speech, Second Annual Conference on Restoration of Coastal Vegetation in Florida,
W77-03943 5G

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Contingency Plan for Spills of Oil and Hazardous Materials for Inland Waters of Region III.
W77-03700 5G

ENVIRONMENTAL PROTECTION AGENCY, SABINE ISLAND, FLA. ESCAMBIA BAY RECOVERY STUDY.
Seagrass Revegetation Attempts in Escambia Bay, Florida, During 1974,
W77-03945 5G

Loss of Submerged Vegetation in the Pensacola Bay System,
W77-03946 5G

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Nonpoint Sources of Pollution: A Federal Perspective,
W77-03917 5G

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Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Copper, Nickel, Chromium, and Zinc Segment of the Electroplating Point Source Category,
W77-03775 5G

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W77-03686 5D

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W77-04031 5C

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W77-03900 5C

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W77-04075 5F

ESSEN UNIV. (GESAMTHOCHSCHULE) WEST GERMANY). INST. OF HYGIENE AND ARBITSMED.
Studies on the Recurrence of Bacterial Flora in Drinking Water After Ozonization, (In German),
W77-04074 5F

EXXON RESEARCH AND ENGINEERING CO., LINDEN, N.J. ANALYTICAL AND INFORMATION DIV.
Measurement of Volatile and Nonvolatile Hydrocarbons in Selected Areas of the Atlantic Ocean,
W77-03911 5A

Hydrocarbons in a Wilderness Lake,
W77-04048 5B

FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON, D.C. OFFICE OF GENERAL COUNSEL.
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W77-03956 6F

FISH AND WILDLIFE SERVICE, COLUMBIA, MO. FISH-PESTICIDE RESEARCH LAB.
Aquatic Food Chain Models for Estimating Bioaccumulation and Biodegradation of Xenobiotics,
W77-03681 5C

FISHERIES AND MARINE SERVICE, OTTAWA (ONTARIO).
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W77-03759 2L

FISHERIES AND MARINE SERVICE, ST. ANDREWS (NEW BRUNSWICK). BIOLOGICAL STATION.
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W77-03677 5B

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W77-04036 5C

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Effects of Pulp Mill Effluent on Phytoplankton Production in Coastal Marine Waters of British Columbia,
W77-03797 5C

Marine Phytoplankton Growth in High Concentrations of Pulp Mill Effluent,
W77-03798 5C

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W77-03902 5C

FISHERIES AND MARINE SERVICE, WINNIPEG (MANITOBA).
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W77-03678 5C

FLINTKOTE CO., WHITE PLAINS, N. Y. (ASSIGNEE).
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W77-03863 3B

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W77-03951 5G

FLORIDA INST. OF TECH., JENSEN BEACH. ENVIRONMENTAL STUDIES.
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W77-03950 5G

FLORIDA UNIV., GAINESVILLE. SCHOOL OF LAW.
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W77-03693 6E

Artificial and Natural Lakes,
W77-03694 6E

Legal Protection for Florida Wetlands,
W77-03696 6E

Environmental Protection in Mexico and Canada,
W77-03698 6E

Coastal Zone Management in Florida,
W77-03699 6E

FOOTSCRAY INST. OF TECH., VICTORIA (AUSTRALIA). DEPT. OF CIVIL ENGINEERING.
Flow in Corrugated Pipes,
W77-03744 8B

FOREST SERVICE (USDA), OGDEN, UTAH. INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
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W77-03755 2B

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W77-03795 4C

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W77-03651 5B

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W77-03878 4B

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W77-03883 6B

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W77-03874 5B

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W77-03888 4B

Hydrologic Effects of Hypothetical Earthquake-Caused Floods Below Jackson Lake, Northwestern Wyoming,
W77-03895 8E

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Reservoir-System Model for the Willamette River Basin, Oregon,
W77-03891 2E

GEOLOGICAL SURVEY, LAGUNA NIGUEL, CALIF.
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W77-03879 5G

GEOLOGICAL SURVEY, LAKEWOOD, COLO. WATER RESOURCES DIV.
Summary Appraisals of the Nation's Ground-Water Resources--Arkansas-White-Red Region,
W77-03877 4B

Preliminary Digital Model of Ground-Water Flow in the Madison Group, Poweder River Basin and Adjacent areas, Wyoming, Montana, South Dakota, North Dakota, and Nebraska,
W77-03882 2F

Water Resources of El Paso County, Colorado,
W77-03890 6D

An Evaluation of Surface-Mine Spoils Area Restoration in Wyoming Using Rainfall Simulation,
W77-03892 5B

The Application of Borehole Geophysics to the Selection and Monitoring of Nuclear Waste Disposal Sites,
W77-03970 5E

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W77-03885 7C

GEOLOGICAL SURVEY, LINCOLN, NEBR. WATER RESOURCES DIV.
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W77-03886 2E

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W77-03876 5B

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W77-03889 4B

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W77-03887 5B

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ERTS-1, A New Window on Our Planet,
W77-03875 7B

Hydrologic Unit Map--1974, State of Colorado.
W77-03893 7C

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W77-03896 1A

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W77-03881 7C

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W77-03971 2C

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Water Availability of Jefferson County, Alabama,
W77-03894 4A

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Public Choice and Urban Water Quality,
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GEORGIA UNIV., ATHENS. DEPT. OF ZOOLOGY.
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GHENT RIJKSUNIVERSITEIT (BELGIUM). SOIL PHYSICS, SOIL CONDITIONING AND HORTICULTURAL SOIL SCIENCES LAB.; AND GHENT RIJKSUNIVERSITEIT (BELGIUM). FACULTEIT LANDBOUWWETENSCHAPPEN.
The Influence of Soil Conditioners on the Liquid-Solid Contact Angles of Sands and Silt Loams,
W77-03626 2G

GIFU UNIV. (JAPAN). DEPT. OF CIVIL ENGINEERING.
Hydraulics of Slope Erosion by Overland Flow,
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GOTEBORG UNIV. (SWEDEN). OCEANOGRAPHIC INST.
On the Description of the Hydrographic State and the Circulation in the Baltic Deep Water,
W77-04006 2L

GOVIND BALLABH PANT UNIV. OF AGRICULTURE AND TECHNOLOGY,

GOVIND BALLABH PANT UNIV. OF AGRICULTURE AND TECHNOLOGY, PANTNAGAR

PANTNAGAR (INDIA). DEPT. OF CIVIL ENGINEERING.
Supercritical Flow Over Sills,
W77-03747 8B

GRACE (W. R.) AND CO., CAMBRIDGE, MASS. (ASSIGNEE).
Inhibition of Scale on Saline Water Heat Exchange Surfaces with Iminodiacetic Acid Compounds,
W77-03872 3A

GUELPH UNIV. (ONTARIO). DEPT. OF ZOOLOGY.
Temperature Effects on Lactate-Glycogen Metabolism in Zinc-Intoxicated Rainbow Trout (Salmo Gairdneri),
W77-04037 5C

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W77-03627 4D

HAMBURG UNIV. (WEST GERMANY). MUSEUM OF ZOOLOGY.
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W77-03923 5G

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The International Law of Scientific Research in the Oceans,
W77-03687 6E

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Institutions and Objectives on the Water, Energy, Environment Interface,
W77-03934 6B

HARVARD UNIV., CAMBRIDGE, MASS. DEPT. OF ECONOMICS.
Effluent Charges and Licenses Under Uncertainty,
W77-03959 5G

HARYANA AGRICULTURAL UNIV., HISSAR, (INDIA). DEPT. OF SOILS.
Rates of Urea Hydrolysis in Five Soils of India,
W77-03632 2G

HAWAII UNIV., HONOLULU. WATER RESOURCES RESEARCH CENTER.
Eutrophication and Fish Toxicity Potentials in a Multiple-Use Subtropical Reservoir,
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Water Quality Monitoring: Kaneohe Bay and Selected Watersheds July to December 1975,
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W77-03819 5D

HILLSBOROUGH COMMUNITY COLL., TAMPA, FLA.
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HITACHI CHEMICAL CO., LTD., TOKYO (JAPAN). (ASSIGNEE).
Device for Purifying Sewage,
W77-03869 5D

HOUSTON UNIV., TEX.
National Economic Models of Industrial Water use and Waste Treatment,
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HYDROCOMP, INC., ATLANTA, GA. ATLANTA REGIONAL OFFICE.
Runoff Files for Flood Hydrograph Simulation,
W77-03748 2E

HYDRONAUTIC, INC., LAUREL, MD.
Fast Current Oil Response System - Stage I, SVROS Development,
W77-03920 5G

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A Preliminary Study of the Magnitude, Frequency and Distribution of Intense Rainfall in Nigeria,
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IDAHO UNIVERSITY, MOSCOW, DEPT OF CIVIL ENGINEERING.
The Potential for Nuclear and Geothermal Power Plant Siting in Idaho as Related to Water Resources,
W77-03730 3E

ILLINOIS STATE UNIV., NORMAL. DEPT. OF BIOLOGICAL SCIENCES; AND ILLINOIS STATE UNIV., NORMAL. DEPT. OF CHEMISTRY.
The Effects of Agricultural Run-off and Siltation on a New Recreational Lake,
W77-03766 5B

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Currents and Pollutant Dispersion in Lake Michigan, Modeled with Emphasis on the Calumet Region,
W77-03732 5B

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W77-04001 2F

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Microanalyse de L'Incorporation d'un Metal Lourd Dans les Ecailles d'un Poisson,
W77-03663 5A

Dynamics of Microbially Produced Fulvic Material in Aquatic Environments Relative to Different Conditions of Temperature and pH,
W77-03664 5C

Dynamique de Degradation du Phenol Dans le Fleuve Saint-Laurent,
W77-03665 5B

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Optimal Long-Term Control of a Multipurpose Reservoir with Indirect Users,
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On Realism and Generality of Bio-Accumulation Models. Towards a General Methodology,
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Forecastings a Line of Investigations of Member Countries of the Council of Mutual Economic Assistance in the Area of Environmental Hygiene, (In Russian),
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Hose or Pipe for Sprinkling or Irrigation,
W77-03864 3F

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Theoretical Model of River Ice Jams,
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W77-03604 5D

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W77-03751 2L

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Reaction Products of Polyphosphates and Orthophosphates with Soils and Influence on Uptake of Phosphorus by Plants,
W77-03636 3F

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Giuseppe Venturoli, Pioneer in Channel Studies,
W77-03833 8B

Preoperational and Operational Hydrothermal Field Data Acquisition and Analysis,
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W77-03790 3E

LIEGE UNIV. (BELGIUM). INSTITUT DE MATHEMATIQUE.
Applied Mathematical Modelling in Marine Science,
W77-04008 2L

LIEGE UNIV. (BELGIUM). LABORATORIES DE MORPHOLOGIE, DE SYSTEMATIQUE ET D'ECOLOGIE ANIMALES.
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Chemical Hazards Response Information System for Multimodal Accidents (Chrisma) (A Reevaluation of Chris for all Modes of Transportation),
W77-03903 5A

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Some Remarks on the Maintenance of the Salinity Distribution in Estuaries,
W77-03764 2L

LIVERPOOL UNIV. (ENGLAND). DEPT. OF BOTANY.
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W77-04059 5C

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W77-04051 5C

LOCKHEED MISSILES AND SPACE INC., SUNNYVALE, CALIF.
A Scientific Basis for Determining Recreational Water Quality Criteria,
W77-04011 5G

LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Determination of Arsenic, Tungsten, and Antimony in Natural Waters by Neutron Activation and Inorganic Ion Exchange,
W77-03788 5A

LOS ALAMOS SCIENTIFIC LAB., N. MEX. ENVIRONMENTAL STUDIES GROUP.
Elements of Quality Assurance in Environmental Surveillance,
W77-03786 7A

LOS ANGELES DEPT. OF WATER AND POWER, CALIF.
Flow at Grade-Break from Mild to Steep Slopes,
W77-03746 8B

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W77-03804 5D

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W77-04005 2J

MARCO APPLIED MARINE ECOLOGY STATION, MARCO ISLAND, FLA.
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W77-03949 5G

MARYLAND UNIV., COLLEGE PARK. DEPT. OF CHEMISTRY.
The Role of Tin in Bacterial Methylation of Mercury,
W77-03668 5B

MARYLAND UNIV., COLLEGE PARK. DEPT. OF MICROBIOLOGY.
Bacterial Mobilization of Mercury in Chesapeake Bay,
W77-03670 5C

Petroleum-Degrading Achlorophyllous Alga Prototheca Zopfi,
W77-04062 5A

Some Effects of Petroleum on Estuarine and Marine Micro-Organisms,
W77-04063 5C

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W77-03914 5C

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W77-03768 5B

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W77-03767 5A

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MELBOURNE AND METROPOLITAN BOARD OF WORKS (AUSTRALIA).
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W77-03800 4D

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Plantings of Red Mangrove (Rhizophora Mangle L.) in Charlotte and St. Lucie Counties, Florida,
W77-03952 5G

MIAMI UNIV., CORAL GABLES, FLA. SCHOOL OF LAW.
Ownership of Submerged Lands in Florida,
W77-03695 6E

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Revegetation of Thalassia Testudinum in a Multiple-Stressed Estuary, North Biscayne Bay, Florida,
W77-03944 5G

MIAMI UNIV., FLA. SCHOOL OF LAW.
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W77-03697 6E

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W77-04039 5C

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W77-03654 5B

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River and Cooling Water Temperature Fluctuations,
W77-03834 5B

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W77-03660 5B

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W77-04027 5C

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W77-03803 8G

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W77-04046 5B

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W77-03858 2H

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W77-03671 5C

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W77-03674 5B

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W77-03679 5B

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W77-04082 5A

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Development of an Oil-Water Pollution Monitoring System,
W77-03908 5A

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W77-03820 5D

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W77-03838 3B

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W77-03925 6A

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W77-03939 6A

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The Integration of Desalination Plant with Existing Australian Water Resources,
W77-04018 3A

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W77-03796 5A

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W77-03757 2D

Evaporative Cooling of a Partially-Wet and Transpiring Leaf-II. Simulated Effect of Variations in Environmental Conditions, Leaf Properties, and Surface Water Characteristics,
W77-03758 2D

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W77-03831 5B

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W77-04010 5D

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Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage,
W77-03958 6G

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W77-03761 2J

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W77-03801 5A

OAK RIDGE NATIONAL LAB., TENN. ECOLOGICAL SCIENCES INFORMATION CENTER.
Thermal Effects on Aquatic Organisms, Annotated Bibliography of the 1975 Literature.
W77-03640 5C

OAK RIDGE NATIONAL LAB. TENN. ENVIRONMENTAL SCIENCES DIV.
Production Dynamics of Alloperla Mediana Banks (Plecoptera:Chloroperlidae) and Diplectrona Modesta Banks (Trichoptera:Hydropsychidae) in Walker Branch, Tennessee,
W77-03953 5C

OFFICE OF WATER RESEARCH AND TECHNOLOGY, WASHINGTON, D. C.
Two Methods for Adding Information to the Resources Management Process,
W77-03935 6B

A Selected Annotated Bibliography on the Analysis of Water Resource Systems, Seventh Volume.
W77-03967 6A

Irrigation Efficiency, A Bibliography, Volume 2.
W77-03968 3F

Social Well-Being and Water Resources Planning,
W77-04013 6B

OHIO STATE UNIV., COLUMBUS.
Quasi-Public Goods: Pricing the Commons,
W77-03936 6A

OKAYAMA UNIV. (JAPAN). DEPT. OF PUBLIC HYGIENE.
Petroleum Components and Objectionable Malodorous Substances in Fish Flesh Polluted by Boiler Fuel Oil,
W77-04053 5C

On the Counterplan for Treatment of Foul Water Which Oozed Out from A Dumping Ground, (In Japanese),
W77-04066 5D

ONTARIO MINISTRY OF THE ENVIRONMENT, TORONTO. INORGANIC TRACE CONTAMINANTS LAB.
The Form of Mercury in Freshwater Fish,
W77-03673 5A

ONTARIO MINISTRY OF THE ENVIRONMENT, TORONTO. SEDIMENT AND BIOMATERIALS LAB.
Sulphide Measurement Using Ammonium Molybdate,
W77-03657 5A

ONTARIO RESEARCH FOUNDATION, SHERIDAN PARK. (ASSIGNEE).
Adsorption Biooxidation Treatment of Waste Waters to Remove Contaminants Thereform,
W77-03865 5D

OREGON STATE UNIV., CORVALLIS. RANGELAND RESOURCES PROGRAM.
Soil Moisture Response to Several Levels of Foliage Removal on Two Utah Ranges,
W77-03629 2G

OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
Steric Contribution to the Seasonal Oscillation of Sea Level Off Oregon,
W77-03912 2L

ORGANISATION EUROPEENNE ET MEDTERRANEENNE POUR LA PROTECTION DES PLANTES.
Weed Control and the Environment, (In French),
W77-04041 5B

OTTAWA UNIV., (ONTARIO). DEPT. OF BIOLOGY.
Microbial Dealings with Heavy Metals,
W77-03666 5C

OTTAWA UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Mercury Transport by Bed Sediment Movements,
W77-03647 5B

Physical Exchange in Stream Ecology Studies,
W77-03648 2J

Suspended Solids and Velocity Distributions in the Ottawa River,
W77-03655 2J

OTTAWA UNIV. (ONTARIO). DEPT. OF GEOLOGY.
The Distribution and Transport of Bed Sediments and Persistent Pollutants in the Ottawa River, Canada,
W77-03645 5B

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LAB., CORVALLIS, OREG.
A Compendium of Lake and Reservoir Data Collected by the National Eutrophication Survey in the Northeast and Northcentral United States.
W77-03784 5C

PENNSYLVANIA DEPT. OF ENVIRONMENTAL RESOURCES, HARRISBURG. BUREAU OF WATER QUALITY MANAGEMENT.
Demonstration of a State Water Quality Management Information System,
W77-04021 5G

PICKARD AND ANDERSON, AUBURN, N.Y.
Coal Pile Leachate - Quantity and Quality Characteristics,
W77-03992 5B

POLISH ACADEMY OF SCIENCES, KRAKOW. ZAKLAD BIOLOGII WOD.
Trace Element Content in the Bottom Sediments and Water of the Rivers Przemsza and Vistula in the Section of its Most Intense Pollution, (In Polish),
W77-04079 5A

PUBLIC ADMINISTRATIVE SERVICE, CHICAGO, ILL.
Water Pollution Control Administration, A Memorandum Report on a Reconnaissance Study.
W77-03684 5G

PUSAN NATIONAL UNIV. (REPUBLIC OF KOREA). INST. OF MARINE SCIENCES.
Effects of Crude Oil Ingredients on the Development and Oxygen Uptake of Hard Clam, Meretrix Lusoria (Roding), (In Korean),
W77-04052 5C

QUEBEC UNIV., RIMOUSKI. DEPT. OF OCEANOGRAPHY; AND QUEBEC UNIV., RIMOUSKI. DEPT. OF PURE SCIENCES.
Variations in Cd, Pb and Cu Content of Waters of the Lower Estuary of the Saint Lawrence During the Summer of 1972, (In French),
W77-04086 5A

QUEENS COLL., FLUSHING, N.Y. DEPT. OF EARTH AND ENVIRONMENTAL SCIENCES.
The Production and Recognition of Aeolian Features on Sand Grains by Silt Abrasion,
W77-03999 2J

RESOURCES FOR THE FUTURE, INC., WASHINGTON, D. C.
Modeling Process Substitutions by LP and MIP,
W77-03933 5G

RHODE ISLAND UNIV., KINGSTON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Ground-Water Pollution Near a Landfill,
W77-03991 5B

RHODE ISLAND UNIV., KINGSTON. DEPT. OF RESOURCE ECONOMICS.
Estimating Net Benefits of Recreation Under Conditions of Excess Demand,
W77-03964 6D

ROHM AND HAAS CO., PHILADELPHIA, PA.
The Use of Macroreticular Polymeric Adsorbents for the Treatment of Waste Effluents,
W77-03605 5D

ROSTOV-ON-DON STATE UNIV. (USSR). RESEARCH INST. OF BIOLOGY.
Change of Biocenoses in Artificial Bodies of Water Due to Human Intervention, (In Russian),
W77-03618 5C

ROYAL INST. OF TECH., STOCKHOLM (SWEDEN). DEPT. OF WATER SUPPLY AND SEWERAGE ENGINEERING.
Equalization of Flow Variations in Combined Sewers,
W77-03860 5D

ROYAL UNIV. OF MALTA, VALLETTA. DEPT. OF BIOLOGY.
Acclimation and Tolerance of Artemia Salina to Copper Salts,
W77-04044 5C

Effect of Heavy Metals on Hatching of Brine Shrimp Eggs,
W77-04047 5C

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J.
The Organic Component of Wind-Blown Soil Aerosol as a Function of Wind Velocity,
W77-03763 2G

SALA MAGNETICS, INC., CAMBRIDGE, MASS.
Pilot Scale High Gradient Magnetic Filtration of Steel Mill Wastewater,
W77-03609 5D

SAN DIEGO STATE UNIV., CALIF. DEPT. OF CIVIL ENGINEERING.
Computer Modeling of Erodible Flood Channels and Deltas,
W77-03993 2J

SCIENCE APPLICATIONS, INC., MCLEAN, VA.
Development of Fast Current Oil Response System,
W77-03904 5G

SCRIPPS INSTITUTION OF OCEANOGRAPHY, SAN DIEGO, CALIF. MARINE PHYSICAL LAB.
Analytic Equation of State for Sea Water,
W77-03770 1B

SHELL DEVELOPMENT CO., HOUSTON, TEX. PIPELNE RESEARCH AND DEVELOPMENT LAB.
A Zero-Relative-Velocity Belt Skimmer,
W77-03899 5C

SIMON FRASER UNIV., BURNABY (BRITISH COLUMBIA). DEPT. OF BIOLOGICAL SCIENCES.
Transport of some Organochlorines in B. C. Waters,
W77-03653 5B

SOCIETATEA DE STIINTE BIOLOGICE DIN R.S.R., BUCHAREST.
Microbiological and Chemical Study of Water in the Baia de Aries Mine, (In Romanian),
W77-04077 5A

SOIL CONSERVATION SERVICE, KLAMATH FALLS, OREG.
Estimating Relative Leaf Water Content with a Simple Beta Gauge Calibration,
W77-03635 7B

SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT, EL SEGUNDO, CALIF.
Mercury in Tissues of Mussel Off Southern California,
W77-04060 5C

STAALICHES FORCHUNGSINSTITUT GEOCHEMISCHES, BAMBERG (WEST GERMANY).
On the Application of Radioisotope X-Ray Fluorescence Analysis for the Solution of Environmental and Industrial Problems,
W77-03612 5A

STATE UNIV. OF NEW YORK AT BINGHAMTON. ECONOMIC GROWTH INST.
A Note on Effluent Charges and Market Structure,
W77-03955 5G

STATE UNIV. OF NEW YORK AT BUFFALO. DEPT. OF EARTH SCIENCES.
Seasonal Variations of Chemical Constituents in Annual Layers of Greenland Deep Ice Deposits,
W77-03773 2C

STRASBOURG UNIV. (FRANCE). INSTITUT DE CHIMIE.
Molecular Test for Oil Pollution in Surface Sediments,
W77-04058 5B

SUGAR RESEARCH INST., MACKAY (AUSTRALIA).
An Investigation of Condensates and Their Contribution to Effluent Disposal from Sugar Mills. Part II. Studies on the Removal of Ethanol from Condensates,
W77-03601 5D

SUOYARVSKAYA KARTONNAYA FABRIKA (USSR).
Manufacture of Boxboard in a Closed Water Cycle (Proizvodstvo korobochnogo kartona pri zamknutom vodooborote),
W77-03791 3E

SWEDISH WATER AND AIR POLLUTION RESEARCH LAB., NYKOPING. BALTIC SEA LAB.
Effects of Oil on the Amphipod Gammarus Oceanicus,
W77-03777 5C

TECHNICAL UNIV., LODZ (POLAND).
Effect of Dyes Used in the Textile Industry on the Purification of Effluents by the Activated Sludge Process (Wplyw niektorych barwnikow stosowanych w przemysle wlokienniczym na oczyszczanie sziekow osadem czynnym),
W77-03821 5D

TECHNICAL UNIV. OF DENMARK, COPENHAGEN. INST. OF HYDRODYNAMICS AND HYDRAULIC ENGINEERING.
Hydraulics of Surface Buoyant Jet,
W77-03743 8B

TECHNION-ISRAEL INST. OF TECH., HAIFA.
Incorporating Outdoor Recreation in a Model of Stream Flow Regulation and Water Quality Improvement,
W77-03932 5G

TEL-AVIV UNIV. (ISRAEL). FOERDER INST. FOR ECONOMIC RESEARCH.
Examination of Environmental Policies Using Production and Pollution Microparameter Distributions,
W77-03961 6G

TEXAS A AND M RESEARCH FOUNDATION, COLLEGE STATION.
The Hydrodynamics of Porous Barrier Oil Recovery Systems,
W77-03906 5G

TEXAS A AND M UNIV., COLLEGE STATION.
Optimum Effort and Rent Distribution in the Gulf of Mexico Shrimp Fishery,
W77-04014 6C

TEXAS A AND M UNIV. COLLEGE STATION. DEPT. OF BIOLOGY.
Accumulation and Release of Petroleum-Derived Aromatic Hydrocarbons by Four Species of Marine Animals,
W77-04045 5C

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF SOIL AND CROP SCIENCES.
Optimization of Crop Irrigation Strategy Under a Stochastic Weather Regime: A Simulation Study,
W77-03941 3F

TEXAS PARKS AND WILDLIFE DEPT., AUSTIN. COASTAL FISHERIES BRANCH.
The Effects of Freshwater Inflows on Hydrological and Biological Parameters in the San Antonio Bay System, Texas,
W77-03897 2L

TEXAS UNIV. AT AUSTIN.
Rollers and Ripples in Sand, Streams and Sky: Rhythmic Alteration of Transverse and Longitudinal Vortices in Three Orders,
W77-03998 2J

TEXAS UNIV., AT AUSTIN. CENTER FOR RESEARCH IN WATER RESOURCES.
Establishment of Operational Guidelines for Texas Coastal Zone Management. Special Report I: Water quality Modelling and Management Studies for Corpus Christi Bay: A large System Approach,
W77-03898 5B

TOBACCO TAX COUNCIL, RICHMOND, VA.
Determining Watershed Sub-Areas with Principal Component Analysis,
W77-04012 4D

TOKAI UNIV., SHIZOUKA (JAPAN). FACULTY OF MARINE SCIENCE AND TECHNOLOGY.
Lightness and Color of the Sea Water in the Tagonoura-Port, (In Japanese),
W77-03965 5A

TORONTO UNIV. (ONTARIO). DEPT. OF BOTANY; AND TORONTO UNIV. (ONTARIO). INST. FOR ENVIRONMENTAL STUDIES AND ENGINEERING.
Heavy Metal Concentrations and Distributions in River Mouth Sediments Around the Great Lakes,
W77-03650 5B

TORONTO UNIV. (ONTARIO). DEPT. OF CHEMICAL ENGINEERING.
Gas Chromatographic Determination of Low Concentrations of Hydrocarbons in Water by Vapor Phase Extraction,
W77-03781 5A

TORONTO UNIV. (ONTARIO). INST. FOR ENVIRONMENTAL STUDIES AND ENGINEERING.
The Symmetry of Effluent Charges and Subsidies for Pollution Control,
W77-03962 5G

TOYAMA UNIV. (JAPAN). RESEARCH INST. FOR WAKANYAKU.
Odorous Compounds in Raw Water of Water Supplies: Identification of Camphor and P-Methylacetophenone, (In Japanese),
W77-04078 5A

TROMSOE UNIV. (NORWAY). INST. OF BIOLOGY AND GEOLOGY.
Deleterious Effects of Corexit 9527 on Fertilization and Development,
W77-04050 5C

UKRAINSKII NAUCHNO-ISSLEDOVATELSKII INSTITUT BUMAGI, KIEV, (USSR).
Purification of Effluents from the Manufacture of Paper and Board by Electrochemical Method (Ochistka stochnykh vod kartonnogo-bumazhnogo proizvodstva elektrokhimicheskim metodom),
W77-03789 5D

Purification of Technical Paper Mill Effluents (Ochistka stochnykh vod fabriki tekhnicheskikh bumag),
W77-03792 5D

UNIVERSITY COLL. OF WALES, ABERYSTWYTH. DEPT. OF GEOGRAPHY; AND UNIVERSITY COLL. OF WALES, ABERYSTWYTH. DEPT. OF GEOLOGY.
Seasonal and Short-Term Variations in the Concentration and Supply of Dissolved Zinc to Polluted Aquatic Environments,
W77-03778 5B

UNIVERSITY OF EAST ANGLIA, NORWICH (ENGLAND). SCHOOL OF ENVIRONMENTAL SCIENCES.
Measurements of Waves in Southampton Water and their Variation with the Velocity of the Tidal Current,
W77-03856 2L

UNIVERSITY OF NEW ENGLAND, ARMIDALE (AUSTRALIA). DEPT.OF GEOGRAPHY.
Desertification and the Salinity Problem in Australia,
W77-03741 4C

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. DEPT. OF GEOLOGICAL SCIENCES.
Applications of ERTS Imagery and Shipboard Observations to Coastal Environments Studies. Part I - Hypersaline Environments, Part II - Coastal Circulation Analysis,
W77-03921 2L

UNIVERSITY PATENTS, INC., STAMFORD, CONN. (ASSIGNEE).
Phosphorus Removal from Wastewater,
W77-03867 5D

UTTAR PRADESH IRRIGATION RESEARCH INST., ROORKEE (INDIA).
Air-Entrainment in High Head Gate Conduits,
W77-03835 8C

VERSAR, INC., SPRINGFIELD, VA.
Technical and Microeconomic Analysis of Cadmium and its Compounds,
W77-03963 5B

VIRGINIA INST. OF MARINE SCIENCE, GLOUCESTER POINT.
Legal Symposium on Wetlands: An Executive Summary, November 1974,
W77-03685 6E

VIRGINIAN POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF BIOLOGY.
Aquatic Organisms Response to Severe Stress Following Acutely Sublethal Toxicant Exposure,
W77-04024 5C

VSESOYUZNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT LESOVODSTVA I MEKHANIZATSII LESNOGO KHOZYAISTVA, PUSHKINO (USSR).
Alteration of Water Regulating and Protective Features of the Forest Under Influence of Forestry Measures, (In Russian),
W77-04002 4C

VSESOYUZNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT TSELLYULOZNO-BUMAZHNOI PROMYSHELENNOSTI, LENINGRAD (USSR).
Potentials of Using Spent Oxygen Bleaching Liquor in the Sulphite Process,
W77-03615 5D

WASHINGTON STATE UNIV., PULLMAN. NUCLEAR RADIATION CENTER.
Adsorption Isotherms for the Uptake of Zinc by Clay Minerals in a Fresh-Water Medium,
W77-03656 5B

WASHINGTON UNIV., SEATTLE, COLL. OF FISHERIES.
Aqueous Leachate from Western Red Cedar: Effects on Some Aquatic Organisms,
W77-03799 5C

WASHINGTON UNIV., SEATTLE. DEPT. OF CIVIL ENGINEERING.
Least Cost Control Strategies in Urban Drainage Design -- A Dynamic Programming Approach,
W77-04007 4A

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
Chlorinated Hydrocarbons in Coastal Marine Ecosystems,
W77-03661 5C

WASHINGTON UNIV., ST. LOUIS, MO. DEPT. OF BIOLOGY.
Mercury and Mercurial Resistance Determined by Plasmids in Escherichia Coli and Pseudomonas Aeruginosa,
W77-03667 5C

WATER RESOURCES CENTER, BUDAPEST (HUNGARY).
Application of Game Theory in Water Management,
W77-04009 6A

WATERLOO UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Model Uncertainty in Flood Frequency Analysis and Frequency-Based Design,
W77-03940 4A

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Mean Circulation in Shallow Seas,
W77-03753 2L

Abyssal Hydrography, Nephelometry, Currents, and Benthic Boundary Layer Structure in the Vema Channel,
W77-04004 2L

WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
Water Resources Data System,
W77-03728 7C

The Application of HYMO to Study Areas of Southwestern Wyoming for Surface Runoff and Soil Loss Estimates,
W77-03729 4A

Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir,
W77-03973 6E

ZAGREB UNIV. (YUGOSLAVIA). INST. OF ZOOLOGY.
Ecosystem of the River Piva and Biological Valorization of its Waters, (In Serbo-Croatian),
W77-03852 5B

ZOOLOGISK MUSEUM, OSLO (NORWAY).
Waterfowl and Acid Precipitation in Norway, (In Danish),
W77-03841 5C

ACCESSION NUMBER INDEX

W77-03601 5D
W77-03602 5D
W77-03603 5D
W77-03604 5D
W77-03605 5D
W77-03606 5D
W77-03607 5D
W77-03608 5D
W77-03609 5D
W77-03610 5D
W77-03611 5D
W77-03612 5A
W77-03613 5D
W77-03614 5A
W77-03615 5D
W77-03616 5D
W77-03617 5D
W77-03618 5C
W77-03619 5D
W77-03620 5G
W77-03621 5A
W77-03622 2I
W77-03623 2I
W77-03624 2H
W77-03625 4A
W77-03626 2G
W77-03627 4D
W77-03628 3F
W77-03629 2G
W77-03630 2I
W77-03631 2G
W77-03632 2G
W77-03633 3C
W77-03634 3F
W77-03635 7B
W77-03636 3F
W77-03637 3F
W77-03638 2B
W77-03639 5G
W77-03640 5C
W77-03641 5C
W77-03642 5B
W77-03643 5B
W77-03644 2E
W77-03645 5B
W77-03646 5B
W77-03647 5B
W77-03648 2J
W77-03649 5B
W77-03650 5B
W77-03651 5B
W77-03652 5B
W77-03653 5B
W77-03654 5B
W77-03655 2J
W77-03656 5B
W77-03657 5A
W77-03658 5B
W77-03659 5C
W77-03660 5B
W77-03661 5C
W77-03662 2K
W77-03663 5A
W77-03664 5C
W77-03665 5B
W77-03666 5C
W77-03667 5C
W77-03668 5B
W77-03669 5B
W77-03670 5C
W77-03671 5C
W77-03672 5B
W77-03673 5A
W77-03674 5B
W77-03675 5B
W77-03676 5B
W77-03677 5B
W77-03678 5C
W77-03679 5B
W77-03680 5B
W77-03681 5C
W77-03682 5B
W77-03683 5B
W77-03684 5G
W77-03685 6E
W77-03686 5D
W77-03687 6E
W77-03688 6E
W77-03689 6E
W77-03690 5D
W77-03691 5C
W77-03692 3D
W77-03693 6E
W77-03694 6E
W77-03695 6E
W77-03696 6E
W77-03697 6E
W77-03698 6E
W77-03699 6E
W77-03700 5G
W77-03701 6G
W77-03702 8A
W77-03703 6E
W77-03704 6E
W77-03705 6E
W77-03706 6E
W77-03707 6E
W77-03708 6E
W77-03709 6E
W77-03710 6E
W77-03711 5G
W77-03712 6E
W77-03713 6E
W77-03714 6E
W77-03715 6E
W77-03716 6E
W77-03717 6E
W77-03718 6E
W77-03719 6E
W77-03720 6E
W77-03721 6E
W77-03722 6E
W77-03723 6E
W77-03724 6E
W77-03725 6E
W77-03726 6E
W77-03727 6E
W77-03728 7C
W77-03729 4A
W77-03730 3E
W77-03731 5B
W77-03732 5B
W77-03733 7C
W77-03734 5D
W77-03735 6B
W77-03736 3F
W77-03737 4C
W77-03738 2B
W77-03739 2D
W77-03740 4C
W77-03741 4C
W77-03742 4D
W77-03743 8B
W77-03744 8B
W77-03745 2C
W77-03746 8B
W77-03747 8B
W77-03748 2E
W77-03749 2D
W77-03750 2L
W77-03751 2L
W77-03752 2F
W77-03753 2L
W77-03754 2L
W77-03755 2B
W77-03756 2B
W77-03757 2D
W77-03758 2D
W77-03759 2L
W77-03760 2L
W77-03761 2J
W77-03762 2L
W77-03763 2G
W77-03764 2L
W77-03765 2C
W77-03766 5B
W77-03767 5A
W77-03768 5B
W77-03769 2L
W77-03770 1B
W77-03771 2F
W77-03772 5D
W77-03773 2C
W77-03774 6F
W77-03775 5G
W77-03776 2L
W77-03777 5C
W77-03778 5B
W77-03779 5A
W77-03780 5A
W77-03781 5A
W77-03782 5C
W77-03783 5G
W77-03784 5C
W77-03785 5A
W77-03786 7A
W77-03787 5A
W77-03788 5A
W77-03789 5D
W77-03790 3E
W77-03791 3E
W77-03792 5D
W77-03793 5B
W77-03794 5A
W77-03795 4C
W77-03796 5A
W77-03797 5C
W77-03798 5C
W77-03799 5C
W77-03800 4D
W77-03801 5A
W77-03802 5D
W77-03803 8G
W77-03804 5D
W77-03805 3E
W77-03806 5D
W77-03807 5D
W77-03808 8G
W77-03809 5D
W77-03810 5E
W77-03811 5D
W77-03812 5D
W77-03813 5D
W77-03814 5D
W77-03815 5D
W77-03816 5D
W77-03817 5E
W77-03818 5D
W77-03819 5D
W77-03820 5D
W77-03821 5D
W77-03822 5D
W77-03823 5D
W77-03824 5D
W77-03825 5C
W77-03826 5B
W77-03827 4D
W77-03828 8B
W77-03829 5B
W77-03830 5G
W77-03831 5B
W77-03832 2E
W77-03833 8B
W77-03834 5B
W77-03835 8C
W77-03836 8B
W77-03837 5B
W77-03838 3B
W77-03839 5C
W77-03840 5B
W77-03841 5C
W77-03842 2L
W77-03843 2L
W77-03844 2L
W77-03845 2L
W77-03846 2L
W77-03847 4A
W77-03848 7B
W77-03849 2D
W77-03850 2E
W77-03851 2C
W77-03852 5B
W77-03853 5G
W77-03854 4B
W77-03855 2G
W77-03856 2L
W77-03857 5B
W77-03858 2H
W77-03859 2D
W77-03860 5D
W77-03861 2G
W77-03862 5C
W77-03863 3B
W77-03864 3F
W77-03865 5D
W77-03866 5E
W77-03867 5D
W77-03868 5G
W77-03869 5D
W77-03870 5G
W77-03871 3F
W77-03872 3A
W77-03873 5D
W77-03874 5B
W77-03875 7B
W77-03876 5B
W77-03877 4B
W77-03878 4B
W77-03879 5G
W77-03880 4A
W77-03881 7C
W77-03882 2F
W77-03883 6B
W77-03884 8B
W77-03885 7C
W77-03886 2E
W77-03887 5B
W77-03888 4B
W77-03889 4B
W77-03890 6D
W77-03891 2E
W77-03892 5B
W77-03893 7C
W77-03894 4A
W77-03895 8E
W77-03896 1A
W77-03897 2L
W77-03898 5B
W77-03899 5C
W77-03900 5C
W77-03901 5C
W77-03902 5C
W77-03903 5A
W77-03904 5G
W77-03905 5G
W77-03906 5G
W77-03907 2L
W77-03908 5A
W77-03909 5A
W77-03910 5A
W77-03911 5A
W77-03912 2L

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W77-04096	5G
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W77-04100	5C

ABSTRACT SOURCES

URCE	ACCESSION NUMBER	TOTAL
CENTERS OF COMPETENCE		
Colorado State University, Irrigation Return Flow Quality	W77-03635--03639 03736	6
Cornell University, Policy Models for Water Resources Systems	W77-03924--03941 04007--04014 04017--04021	31
ERDA Oak Ridge National Laboratory, Nuclear Radiation and Safety	W77-03640--03683	44
Franklin Institute (FIRL), Municipal and Industrial Wastewater Treatment Technology	W77-03601--03617 03619--03621	20
Illinois State Water Survey, Hydrology	W77-03743--03771 03773--03774 03832--03838 03840 03842--03851 03854--03861 03972 03974--04001 04003--04006	90
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W77-03787--03824	38
University of Arizona, Arid Land Water Resources	W77-03622--03634 03737--03742	19
University of Florida, Eastern U. S. Water Law	W77-03684--03690 03692--03727 03973	44
University of Wisconsin, Eutrophication	W77-03776--03786 03942--03954	24
University of Wisconsin, Water Resources Economics	W77-03775 03955--03964	11

SOURCE	ACCESSION NUMBER	TOTAL
B. STATE WATER RESOURCES RESEARCH INSTITUTES	W77-03728--03735 03825--03831 03969	16
C. OTHER		
BioSciences Information Service	W77-03618, 03691 03772, 03839 03841 03852--03853 03862, 03965 04002 04015--04016 04032--04033 04041, 04055 04064--04100	53
Biological Consultant and Information Services (Effects of Pollutants on Aquatic Life)	W77-04022--04031 04034--04040 04042--04054 04056--04063	38
Ocean Engineering Information Service (Patents)	W77-03863--03873	11
Ocean Engineering Information Service (Outer Continental Shelf)	W77-03897--03923	27
Office of Water Research and Technology	W77-03966--03968	3
U. S. Geological Survey	W77-03874--03896 03970--03971	25

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